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BY

MINNIE GOODNOW, R. N.

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WAR NURSING

A TEXT-BOOK FOR THE AUXILIARY NURSE

BY

MINNIE GOODNOW, R. N.

War Nurse in France

ILLUSTRATED

PHILADELPHIA AND LONDON

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Dedicated to
All Nurses, Trained or Untrained,
of Whatever Country,
Who Have Served Their Nation
in the Great War.

FOREWORD

With the largest part of the civilized world at war, millions of men in the fighting lines, every day bringing thousands of freshly wounded and sick, women everywhere are eager to help their country and their men. Nursing the wounded has been woman's work ever since the world began, and it is an essentially womanly work.

The modern woman recognizes the need of training for war nursing, the more so that in this war medical science and surgical skill have developed to a point where special knowledge is absolutely requisite. Thousands of women, not hospital trained, have tried to prepare themselves to be of assistance in war nursing. Many of them have taken short, practical courses of one sort or another. With them all there has been a constant demand for a text-book of nursing as applied to war; more, a book on nursing as applied to *this* war.

It is to meet this demand that the present work is put forth. It is not meant for the graduate nurse, but for the auxiliary, the Nurse's Aid, who has had little or no previous training, but who wishes to learn the fundamental things which will be of use to her in war service.

Endeavor has been made to keep the book unencumbered with extraneous matter not applicable to military nursing. It strives to be a work adapted to war conditions and to war hospitals. It is hoped that the inex-

perienced nurse will find it of value when she comes to actually face a ward of wounded men.

It can also be used as a text for teaching Red Cross and other training classes.

The author's acquaintance with war surgeons and with nurses who have served in various parts of the war zone, together with her own experience in France, with the Harvard Unit, with the auxiliary hospital at St. Valery-en-Caux, and with the American Red Cross Hospital of Paris, has given her opportunity for knowing war conditions.

MINNIE GOODNOW, R. N.

December, 1917.

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WAR NURSING

CHAPTER I

ETIQUETTE AND DISCIPLINE

Relation Between Patient and Nurse.—It must be borne in mind that the relationship between a sick man and his nurse is one which does not exist in ordinary life, and which must, therefore, be governed by special rules. Nursing involves a certain amount of mothering, if you will, of handling the person, of a peculiar sort of intimacy new to both patient and nurse. There must be real friendliness without loss of respect, a fine balance between condescension and cordiality. The man must be put at his ease by a matter-of-fact manner, but never permitted to feel anything approaching familiarity. Nursing must be done without any suggestion of prudishness or embarrassment, but with a fine reserve and dignity.

Spirit of the Service.—One does not go into war nursing for the mere adventure of it, but for the purpose of serving one's country or an ally in a time of serious need. The war nurse should, therefore, maintain a dignity and purity of life commensurate with the high purpose which everyone assumes her to possess.

War Hospitals.—There are many varieties of hospitals which care for wounded or sick soldiers. There is the strictly *military* hospital, where officials and staff, including nurses, are actually enlisted in the army and subject to military discipline. There is the *auxiliary* hospital, in which the work is to a certain extent controlled by the War Office, but whose staff is a private concern. There is also the *privately owned* and managed hospital that is permitted to care for soldier patients.

In all of them there is a certain amount of official red tape and a certain number of military regulations which must be strictly observed. Some of these may seem trivial, but are of vital importance when millions of men are being accounted for.

Superior Officers.—The man in charge of the hospital, the *commanding officer*, has supreme control, and his decisions may not be questioned except by a devious process of protest to his chief. Inferiors of all grades must do exactly as directed by their superiors, whether there is any obvious reason or not. A quartermaster cannot issue supplies, a sergeant-major cannot provide help except in accordance with rulings from higher up; if he breaks over rules, no matter how slightly, he may be in serious trouble. The nurse, therefore, should never be guilty of asking for things that have once been refused, because by her insistence she is sure to subject someone to a penalty.

The *matron* of a military hospital is supreme in the control of the nurses, but is herself subject to the commanding officer and to the numberless regulations of the War Office. Often a thing which would seem very simple for her to do is impossible because it involves other people or interferes with army rules.

The Nurse's Position.—The army nurse must, therefore, learn to accept conditions as she finds them. She must neither protest nor attempt to evade. If she does, disaster or disgrace will fall upon her or upon some other person. She must be a good soldier, uncomplaining, unquestioningly obedient. The nurse, whether she be fully trained or an auxiliary, is not permitted to make suggestions to a doctor, nor must she criticize his work nor his orders.

In the British army, "sisters"—*i. e.*, trained nurses—are ranked as lieutenants, yet neither here nor in other countries is it required that a soldier or officer salute a nurse. He may do it as a mark of respect, but it is not necessary. The French are fond of saluting their nurses, but there is no disrespect if they omit it.

Etiquette.—Nurses must rise when a superior officer of any rank enters the room. This includes all military officials (commissioned),[1] medical officers, the matron, and the nurse in charge of the ward. Officers are distinguished by stripes or insignia on sleeves or shoulders, matrons and charge nurses by their dress. Doctors are always commissioned officers, ranking as lieutenant, captain, major, or colonel. They are called "medical officers."

Army regulations about personal matters, dress, living quarters, where one may or may not go, what one may or may not do, should—as a matter of patriotism—be strictly observed. The nurse who breaks rules, no matter how unnecessary they may appear to her, is laying open to criticism not merely herself, but her hospital, the whole nursing service, and her country. These things should make one think twice.

Ward Discipline.—In a hospital ward the nurse in charge is the commanding officer, and must be obeyed and deferred to by other nurses and by the patients. The matron and the doctors are her superior officers, from whom she takes her orders. Patients are subject to the orders of the nurses, acting under the medical officers or charge nurse. If a patient refuses a medicine or treatment or disobeys a ward rule the auxiliary nurse may protest, and if he persists report the matter to the charge nurse, who will if necessary report it to the medical officer. In hospitals strictly military it is usually understood that the man of highest rank in the ward is responsible for its discipline.

Orderlies are primarily responsible to their military head, but are also under the charge nurse. Auxiliaries

[1] Military rank in the British army is as follows, beginning with the lowest:

Non-commissioned	Private soldier. Lance corporal. Corporal. Sergeant. Staff sergeant. Sergeant-major.	Commissioned	Second lieutenant. Lieutenant. Captain. Major. Lieutenant-colonel. Colonel.

The American and French are practically the same.

may request service from them, but cannot command it.

Women orderlies are under the head or charge nurse, but are hired by, and therefore responsible to, the housekeeper or hospital head.

Entertaining Patients.—There are many dull hours in a soldier-patient's life, and a nurse may do much toward relieving their tedium. The men themselves sometimes take the initiative, but they need assistance and materials. Nurses should see that those who want to write letters have paper and pencil; that those who like to read have books or magazines of the sort they find interesting. Picture puzzles of from 75 to 150 pieces, checkers, cards, and mechanical puzzles will be much used. A gramophone is of inestimable value; even an accordion or a mandolin will be kept busy.

Most established hospitals have a supply of these things, but it is the nurse's business to see that they are made available to the patients. If there is a lack, a letter to friends at home will bring a substantial response.

Auxiliaries can do much valuable work in providing materials and instructing disabled men in light occupations, such as macramé, wood-carving, weaving, and knitting in all their forms, etc. Soldiers are always ready to help in preparing hospital dressings and supplies; they usually make cotton balls, fold sponges, and roll bandages with great exactness.

It is always good form to give cigarettes or tobacco to soldiers, but one must see that the ward rules in regard to their use are observed. Wines or liquors are forbidden. Chocolate, cakes, fruit, or flowers are always welcome and permissible. Birthday and holiday treats are appreciated and are in order.

CHAPTER II

THE HOSPITAL WARD

Cleanliness is godliness when the care of the sick or wounded is concerned. A good nurse will secure cleanliness under the most difficult conditions.

Removal of dust and dirt from a hospital ward is important because disease germs are invariably present in it. In ordinary life dirt merely looks badly; in a hospital it is a distinct menace to the patients.

A **clean ward** is one in which the *floor,* the bedside *tables,* the *cupboards* and store *closets,* the *outside* of the beds, the *inside* of the beds, the patients' *clothing* and their *persons* are clean, and in which everything is *in order* so far as is consistent with the work going on and with the patients' recreation.

Nurses are the ones primarily responsible for the cleanliness of a ward and its contents. There are usually orderlies to do the rough cleaning. The sweeping may be done by convalescent patients; before it is begun the floor should be lightly sprinkled to prevent dust flying about. The beds should be wiped with a damp cloth; the bedside tables or lockers should be wiped off and put in order; window sills, door moldings, and base-boards should also be cleansed, and the charge nurse's desk put in order. Plants and flowers should have fresh water daily. All rubbish, such as old papers, cigarette ashes, bits of food, medicine glasses, etc., should be removed; patients' small effects and clothing should be folded and arranged; the men who are able do this for themselves. Books, magazines, and games that are not being used should be collected and put into one place. Beds, tables, and chairs should be set in proper position, the beds on a line.

Good **ventilation** is necessary where a number of people live day and night in one room. Tent wards present no difficulties in this respect, as it is impossible to close them tightly, but in huts or buildings of any sort the nurse must look after it. Though soldiers are accustomed to an outdoor life, in cold or damp weather they are likely to close everything as tightly as they can. It is difficult in crowded wards to open windows without drafts coming on

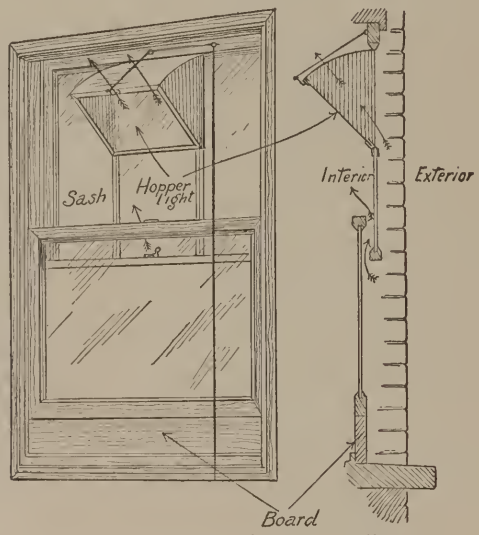


Fig. 1.—Window with "hopper" top.

patients who are near them. The British army huts have windows which are ideal, the top sash being arranged as a "hopper" (Fig. 1).

How to Ventilate.—A blanket may be pinned or tacked by one corner high on the window casing, the next corner being fastened to a chair or bedside table, thus making a screen which protects the patient from a direct draft (Fig. 2). French windows, the sort which one nearly always finds abroad, may be opened slightly and tied, leaving

a good-sized crack all the way up and an opening top and bottom. One can always leave the door of the ward open and thereby secure a certain amount of indirect ventilation. Or, one may *several times a day* ask the men to cover up warmly, open all the windows, and air out for a few minutes.

Since wards of war hospitals are rarely heated, any waste of fuel that might be involved in the ventilating process need not be considered.

Fig. 2.—Screen made with blanket and chair (Aikens).

Heating.—If there are any means of heating the wards they are only for occasional use, and should be employed with care and judgment. Fuel is usually expensive and hard to get. The fires, whether they be of coal, wood, or oil, should be lighted only when most needed, as for baths or dressings. Ordinarily a hot-water bottle and an extra blanket are more readily available than a fire.

Care of Plumbing.—The ward plumbing may be com-

plicated, simple, or none at all. There will rarely be more than one or two sinks and a toilet. The orderly usually cleans the toilet, but the nurse should see that there is a brush kept for the purpose, also that the toilet-paper supplied is in pieces small enough not to block the waste-pipe.

The nurse usually cares for the sinks. She should see that no improper substances, such as tea leaves, coffee-grounds, fruit skins, remains of poultices, etc., are ever put into it. Frequent rinsing does much toward keeping a sink clean. Do not use sand-soap or sapolio for cleaning a sink, as it spoils the enamel; use yellow soap or a little kerosene or petrol if it can be had. Sal soda (washing soda) removes grease.

If there is a bath-tub it should have the same care as the sink.

Care of Utensils.—Bed-pans and urinals are usually cleaned by the orderly, or the nurse may have to do them. If they are thoroughly rinsed as soon as emptied the cleaning will not be difficult. Bed-pans may be scrubbed out with the brush used for the toilet and afterward well washed; disinfectants are too expensive to be used for these utensils.

Hand basins should be rinsed out as soon as used and scrubbed with soap and water.

Irrigating cans should not need scrubbing if they are emptied and well rinsed after using; let clear water run through the tubing.

Mackintoshes from the beds or pieces of rubber sheeting used in doing dressings should be spread on a table and washed with a cloth, using either soap and water or a disinfecting solution. (A brush is better for cleaning rough surfaces, a cloth for smooth surfaces.)

Care of the Hands.—A nurse must care for her hands when doing cleaning or rough work and after using disinfecting solutions in dressings, etc. If she allows them to become chapped or irritated, it will be impossible to get them thoroughly clean, and they become a source of danger to herself and others. One may wear rubber gloves for

cleaning; they should be the heavy (the so-called "post-mortem") kind, as the lighter surgeons' gloves wear out very quickly. A nurse should aim to keep her hands *out of* infectious matter and *away* from discharges of any sort so far as possible, should scrub them thoroughly when she has finished any dirty work, and should wash them carefully before going to meals. Dry the hands thoroughly, as this is an important factor in keeping them from becoming chapped. It is advisable to provide oneself with a bottle of hand lotion and keep it on the ward for use several times a day.

If there is the slightest tendency to chilblains on the hands, report it to the charge nurse or matron and ask for a remedy; if neglected, they quickly become serious. Do not allow the hands to remain cold for a long period.[1]

Care of Linen.—Neither bed nor body linen should be changed unnecessarily, as laundry is always expensive and frequently hard to get done at all. Whenever possible a towel or a sheet should be made to do for another day. Beds and wards should be kept as clean as may be, but almost never should a thing be changed merely for appearance; on the other hand, a shirt or any article which comes into direct contact with the patient's body should never be left on when it is really soiled. Soldiers disregard dampness, and think that a little liquid spilled in the bed does not matter; the nurse must use her judgment in these cases.

Torn articles should not be used, but laid aside to be sent to the linen-room for the "stitch in time"; or the nurse herself may find time to do a simple repair.

Linen stained with blood, feces, or other discharges should be put to soak in plain cold water; after an hour or so a thorough rinsing, preferably under a faucet, will remove practically all of the stain. In some hospitals such articles must be dried before sending to the laundry.

[1] A good remedy for chilblains is to soak them in a hot, strong solution of washing soda and apply an ointment of two-fifths beeswax and three-fifths olive oil.

Economy.—Rigid economy must be practised by everyone in a war hospital. Supplies of all sorts must be used as sparingly as is consistent with good work, since one never knows when a certain material may be impossible to get or the price become prohibitive. One should also economize in the matter of labor, since it is neither sensible nor right to employ labor that may be more needed elsewhere.

CHAPTER III

BED MAKING AND CHANGING

Beds.—Military hospital bedsteads are ordinarily about 30 inches wide, of iron, with a low headpiece and no foot, or only enough to prevent the mattress from slipping. In an emergency one may have to use canvas cots or even nurse patients lying on stretchers. In rare instances the beds may consist of straw laid on the floor. Sometimes one must use hotel beds or any sort that is at hand and adapt them to hospital purposes.

Army mattresses are usually good, though somewhat hard, but even the worst is better than what the soldier is accustomed to when in service. In the British army mattresses are in three pieces.[1]

French and British army beds are provided with bolsters, which serve as a second pillow.

Army beds are usually allowed two sheets, one or two pillow cases, and three heavy single blankets. There may or may not be a spread or counterpane.

Making the Empty Bed.—Spread the *lower* sheet—the largest you have if there is a difference in size—over the mattress, right side uppermost, placing the middle fold of the sheet exactly in the middle of the bed; tuck it well under the top, even if it comes a little short at the bottom. If a bolster is used, extra long sheets are provided, so that they may be turned up over the bolster and tucked under its front instead of being tucked under the head of the mattress (Fig. 3), or the bolster may be treated as part of the mattress, the sheet put over it, and tucked in as usual. In some hospitals bolster cases are provided. Tuck in the bottom of the lower sheet, pulling it tight; then tuck in one

[1] Three-piece mattresses are easier to handle and transport.

side, making it smooth underneath and firm, so that it will not pull out when the patient moves about in bed. Fold the corners neatly, making a "box" (perpendicular) or "hospital" (diagnonal) fold.[1] Go to the other side of the bed, pull the sheet tightly, and tuck it under as far as you can, adjusting the corners as above. The lower sheet must be *tight, smooth,* and *firmly adjusted* if it is to stay in place or be comfortable.

If the bed is to be protected by a mackintosh or rubber sheet (an eminently desirable arrangement, but only possible in a war hospital for part of the cases), it should be spread smoothly over the portion to be protected—head,

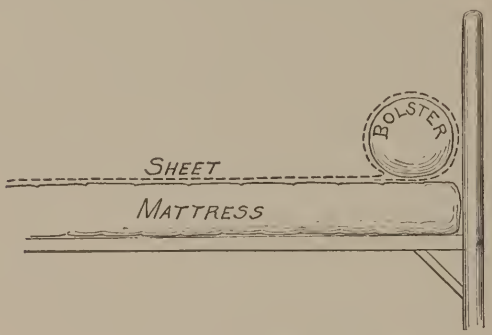


Fig. 3.—Bolster covered by sheet.

foot, or middle—covered with a smaller (*draw*) sheet, and the whole tucked far under so smoothly and tightly that it shall appear like part of the lower sheet. If the mackintosh is too small to be tucked under, it must be pinned to the side (not the top) of the mattress with a large safety-pin, taking a large bite so that it shall not tear out. The adjustment of mackintosh and draw-sheet is the most difficult part of bedmaking, as they must be so placed and fastened that they will remain absolutely smooth.

Put on the *top* sheet with the right side down, exactly in the middle of the bed. Make it tuck well under at the

[1] These are best taught by demonstration.

foot or it will be quickly pulled out. It should come to the top of the mattress or a little more; pull it smooth; tuck it in at the foot only.

Spread smoothly over it the *blankets*, one or two, according to season and weather. Pull each one free from wrinkles and tuck in at the bottom of the bed; the top edge should come about 6 inches below the top of the mattress. If there is to be a counterpane, turn the top of the sheet over the edge of the blankets so as to protect them and keep them from rubbing against the patient's face. Make a hospital corner at the foot and tuck the sides in smoothly. A bed looks better if each piece of covering is put on and tucked in separately, but a war nurse does not always have time for this.

If a spread or *counterpane* is used, tuck the blankets in about halfway up before putting it on; place the spread exactly in the middle of the bed, tuck it well under the foot, making a hospital corner, and let the sides hang.[1] At the top, put it under the folded-down sheet, folding in its edge if necessary.

The corners of the *pillow* should be put carefully into the corners of the case. Lay the pillow on a table, press it flat and smooth with both hands, then transfer it to the bed. The open end of the pillow case should be away from the door or from the charge nurse's desk. If a pillow case is too large, the slack should come at the bottom of the pillow; if put at the top, it soon becomes a mass of wrinkles.

A **fracture bed** has boards put over the springs, under the mattress, so as to make it firm and stiff. These are used only in thigh and hip fractures.

A **convoy**[2] **bed** is made exactly like an ordinary bed, except that it is not tucked in at the sides; it is then opened—*i. e.*, the top covers turned down to the foot and a

[1] In British military hospitals counterpanes are tucked in all the way up.

[2] A *convoy* is a large group of wounded or sick sent by hospital train or ambulances. In war hospitals patients are almost never admitted singly, but in groups. A convoy numbering 50 is considered very small—100 to 300 at once is much more common.

"receiving" blanket or sheet put into it. This may be a dark blanket, folded lengthwise, so that it may be put both under and over the patient, or it may be an extra clean sheet if laundry is plentiful. After this is adjusted the bed is either closed or left open, according to when the wounded are expected to arrive.

When the wounded come they are usually fully dressed. The beds are opened and the patients, whether "stretcher" or "walking" cases, are placed on the receiving sheet or blanket, wrapped in it, and covered with the upper bedding until one has time to undress and bathe them. The re-

Fig. 4.—Ether bed. A bed arranged for return of a patient from operation (Sanders).

ceiving-sheet is removed after the admitting bath has been given.

An **ether bed** is one for a patient coming back after an anesthetic and operation. It is made as usual except that it is not tucked in at the foot nor one side; the sheet is folded neatly back over the other covers, and the whole mass of bedding rolled or folded from one edge over to the tucked-in edge (Fig. 4), thus leaving the bed open and the

covers where one movement of the arm will pull them over the patient. The pillow is laid aside and a towel pinned flat on the bed in its place. An extra blanket is placed—usually folded lengthwise—inside the bed so as to come next the patient. Two or three hot-water bottles or cans are placed in the bed to warm it; these are not removed until the patient arrives; they should not be put into the bed again so long as the patient is unconscious except by order of the charge nurse or the medical officer. On the table beside the bed put a small basin (a "pus" or kidney-shaped

Fig. 5.—Changing the under sheet and draw-sheet (from Sanders' "Modern Methods in Nursing").

basin is best) for use in case of vomiting, and some small pieces of gauze or soft cloth to wipe the patient's mouth.

Changing an Occupied Bed.—*Draw-sheet.*—Loosen both edges of the sheet, turn the patient on his side, roll the soiled sheet up as tightly as possible against his back (taking care that any wet or soiled portion is inside the roll), lay the fresh sheet lightly over the bed so as to get it in the center, and tuck it smoothly and snugly in at

the side. Roll the rest of the fresh sheet tightly against the soiled sheet, push it down firmly, turn the patient to his other side right over the two rolls of sheet, remove the soiled sheet, pull the fresh one smooth, and tuck it in (Fig. 5). To be sure that the draw-sheet is smooth under a patient's back; pull it gently until you can *see* it pull on the other side of the bed; if this is not done, it may look all right, but leave several unsuspected wrinkles in the middle of his back.

If the patient is not allowed to turn, as in fracture of the hip or thigh, it is more difficult to change the draw-sheet. It takes two nurses to do it properly, one to lift the patient a trifle, the other to adjust the sheet. With a very heavy patient it may be necessary to remove the soiled sheet first and afterward adjust the clean one.

The *lower sheet* is managed in exactly the same manner as the draw-sheet, but is a little more trouble to change dextrously. With practice the lower sheet and the draw-sheet may be changed at the same time, turning the patient but once.

To change the *top sheet* without exposing the patient loosen the covers all around, all but the sheet and one blanket, spread the fresh sheet smoothly over these and an extra blanket over it: then, holding the two outside covers with one hand (the patient may do this for you if he is able), pull the inside covers—the soiled sheet and blanket —from underneath and off the bed.

Or, the fresh sheet may be placed across the patient's chest, folded back and forth crosswise; by slipping the hand under the covers, the clean sheet may be pulled down to the foot and the soiled one removed at the same time. Or the changing may be done from side to side. All these methods take considerable practice.

To change a *pillow*, place the fresh one at the head of the bed where you can reach it, slip your hand down under the patient's back, between the shoulder-blades, so that the back of the neck and the head rest on your arm, lift the patient gently, slip the pillow out with the other hand, lay it aside, and slip the fresh one in (Fig. 5).

Usually the pillow should go just under the edge of the patient's shoulders. If two pillows are used the top one goes under only the head. Patients have many peculiarities in regard to the arrangement of pillows, and what is

Fig. 6.—Changing pillow.

comfortable for one is not necessarily so for another. If a patient *looks* comfortable he is likely to be so, and vice versa.

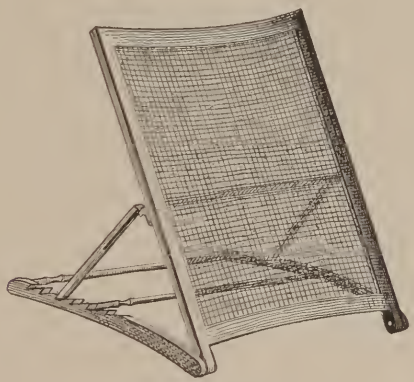


Fig. 7.—Back-rest.

Back-rests, or bed-rests (Fig. 7), are usually frames of wood with canvas stretched on them. They are used to

prop a patient when he sits up in bed. They are adjustable to different slants.

Bed cradles (Fig. 8) are frames of iron or wood used to take the weight of the bedding off some portion of the

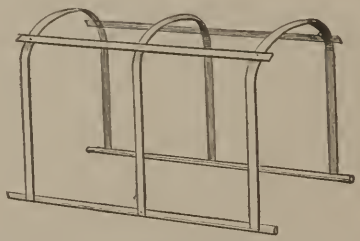


Fig. 8.—Bed-cradle for protecting patient from pressure of bedclothes (Stoney).

body. They may be small enough for a leg or arm or large enough for both legs or the body.

Circular air-cushions (Fig. 9) are used chiefly to relieve pressure on the lower part of the back when the

Fig. 9.—Circular air-cushion.

patient is obliged to lie flat for long periods. They should be filled full enough to afford support, but not made too hard; the metal inlet should come at the side, never under the patient's back. They should be covered when in use with a pillow-case, bandage, or cover made to fit.

Protecting Pillows.—A pillow used under a wounded

limb or near a wound or a wet dressing should always be protected by a rubber pillow-case under the white one. A pillow once wet or soiled is almost impossible to clean.

Bed-sores.—Patients who are very thin, who have wet dressings on or near the body, who have high fever, whose nutrition is bad, who are paralyzed, whose circulation is poor, who have involuntary bowel movements or urination, or who for any reason have to lie long in one position (as with fractures of the hip, thigh, or leg) easily develop bed-sores.

These usually appear at the lower part of the back, over the sacrum; they may occur over the hip bones or shoulder-blades or wherever a bone comes near the surface. They begin with mere redness of the skin and may develop into a raw sore, hard to heal.

Bed-sores are due to pressure, moisture, and lack of cleanliness. Except in the rarest instances they are a mark of poor nursing. As a rule they are absolutely preventable.

Pressure may be avoided by using *circular cushions*, by frequent *change of position* (when this is possible), and by frequent and thorough *rubbing* to stir the circulation. Except with wet dressings or freely draining wounds, or in cases of incontinence of urine or feces, there is no excuse for moisture and uncleanliness. Wrinkles and crumbs may cause bed-sores.

Bathing with soap and water and rubbing with alcohol and with talcum powder are useful in preventing bed-sores. If a case is constantly wet, powder is not useful, but some substance which resists moisture, such as zinc-oxid ointment, etc., may be used. A coating of flexible collodion often helps.

Frequent attention is the best preventive. No matter how thorough one may be, once or twice a day is not enough. Difficult cases must have care every few hours if success is to be expected.

If there is a redness of the skin over a bone or an excoriation it should immediately be reported and shown to the nurse in charge of the ward.

CHAPTER IV

HANDLING AND BATHING

Undressing a Patient.—Before commencing to undress a wounded man ask him the location of his wounds, so that you may handle him with regard to them. Put away his cap or helmet, remove his shoes, setting them temporarily under his bed, so that they shall not become mixed with others. Take off his socks. Then remove trousers and drawers together, his shirt meantime covering the genitals. If one leg is wounded, loosen the clothing of *the uninjured one first*, so that you may have it free for careful handling of the injured one. If the trousers will not slip off, rip the leg from the bottom up, or cut it very close to the seam. (It takes only half a minute longer to do it so that the garment can be repaired and used again.) Pull the bedding quickly up to the man's waist. Take off his coat, remembering that *the injured side must come out last.* Remove shirt and undershirt together if possible. If a shirt must be cut, let it be straight down the front or along the seam.

Wrap the man in the receiving-blanket or sheet until you can give him a bath; or, if the bath is to be left until later, put a hospital shirt on him and cover him well. In putting on a shirt or other garment *dress the injured limb first.*

Care of Clothing.—Clothing worn by the soldier upon admission to hospital must be labeled carefully, so that it may be returned to him upon his discharge or accounted for to the army. This accounting is managed in various ways, according to the class and location of the hospital.

The nurse's duty is to see that all articles belonging to a patient are put together and labeled with his name or

number and are delivered to the person who is responsible for them. Confusion of bundles or any mistake involves much trouble and embarrassment. Small belongings are retained by the patient and kept in his locker or bedside table. The nurse must see to these for a badly wounded patient.

Bed Bath.—A soldier is always ready to help with his own bath as much as he can. A man injured only in the leg can usually take his entire bath by himself, except that he may need help with his back.

Before beginning a bath, see that you have everything in readiness for it. You will need soap, a wash cloth, one or two towels (most hospitals provide a bath and a face towel for each man), a good-sized wash-basin, a slop-pail, and a pitcher of hot water. Have the water as hot as you can bear your hands in, as it will cool very quickly.

Spread the face towel over the pillow to avoid wetting it, and bathe the face and ears first. Rub gently, but get into all the corners. Keep the wash-cloth well spread out over your hand and do not let the ends drag. Be careful about soap near the eyes. Wash also the front of the neck. Some men, if the hair is short, like the whole head washed; in doing this, support the head by placing your hand at the back of the neck.

Expose one portion of the body at a time, bathe it, using soap, rinse, dry, and cover. It is usually convenient to observe the following order: right arm, left arm, chest, abdomen, right thigh and leg, left thigh and leg, back and back of neck, feet; or the back may be done before the legs and the shirt put on. This order of procedure will have to be altered according to the location and severity of the wounds. The patient will wash the genitals himself unless both hands are disabled. Give him the wash-cloth and request him to do it. The water in the basin will need changing when you are about half through with the bath. If possible, finish by rubbing the back with alcohol and afterward with powder (talcum).

It is impossible to get hands and feet clean by washing

them with a cloth; put them *into* the basin and scrub them with a brush if they are very dirty. For the feet the man must be able to bend his knees and the basin must be held with one hand while the bathing is done with the other (Fig. 10). They may be put into the basin one at a time or both together. Be sure to cleanse thoroughly between the toes.

Fig. 10.—Foot bath in bed.

Trim finger- and toe-nails and clean them.

Washing Hair.—Have the man put his head out over the edge of the bed; protect it with a rubber sheet fastened about his neck; scrub his head with soap and hot water, using a brush to get the scalp clean. Rinse with plenty of warm water, applying it by means of a cloth.

Handling Patients.—In moving a patient consider the body as having two parts, the shoulders and hips. The

head, feet, and arms, if not injured, will take care of themselves. *Any wounded part must have special support.* Think that you are to move not only the patient's flesh but his bones. Be sure that you have a firm hold not merely of the exterior of the body, but of its framework, otherwise your hands will slip and pull.

A wounded *leg* is lifted by putting one hand at the back of the ankle, the other under the knee (Fig. 11). Do not lift a leg by grasping the foot or toes.

A wounded *arm* is lifted by placing one hand under the elbow, the other under the wrist.

Fig. 11.—How to lift an injured leg.

Lifting About in Bed.—Lift shoulders and hips separately; slide one arm diagonally *over* the shoulder nearest you, the other arm *under* the opposite shoulder until the fingers of the two hands touch or overlap at the back; this gives a firm hold and makes the lifting of even a heavy patient comparatively easy (Fig. 12). For the hips use the same method, one arm going diagonally under one hip, the other diagonally over the other until the fingers meet.

Always have the patient bend one or both knees if possible when you are lifting the hips, as it takes off much of the weight; without this precaution, lifting may be impossible or you may need help.

Turning Patient in Bed.—To turn a patient in bed, slip one hand well under the hips, the other well under the shoulders, so that the fingers go beyond the spine. Lift slightly and roll him over. (Practise doing it from both sides of the bed, rolling the patient both toward and away from you.) Then, standing at the back, slip one hand well under the hip, the other just below the buttock, get a firm hold of the hip bone and pull the hips gently back toward

Fig. 12.—Lifting patient in bed.

you; this gives the bend of the body which is necessary for comfort.

When a patient lies flat on his back he is usually more comfortable with the knees drawn up. If they need support, a large, rather firm pillow or knee-roll filled with hair is used.

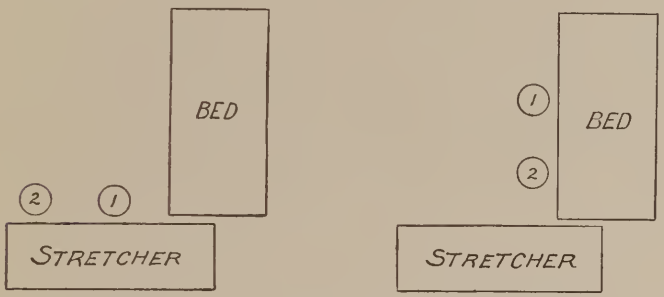
Setting a Patient Up in Bed.—If you are to use pillows or back-rest practise first with someone to place them for you. Slip one arm diagonally over the shoulder nearest you, the other under the shoulder away from you. Have

the patient take hold of your shoulder. After you have learned to do it in this way, try holding the patient with one arm and placing the pillows or back-rest with the other.

As a matter of fact a soldier is a very athletic man, and even when wounded is able and willing to help himself in ways that would be impossible to a civilian or weak-muscled person.

Sick soldiers are, strange to say, usually less able to help themselves than are the wounded ones.

Support in a Sitting Position.—A patient sitting up in bed needs a firm support under his thighs to prevent him slipping. This may be a pillow, roll, triangular stool, etc.



First position. Second position.

Fig. 13.—Transferring patient from stretcher to bed.

It will need to be tied with a bandage to the bed rails or in some way fastened firmly. Or the feet may be placed against a firm pillow.

Lifting from Bed to Stretcher, or Vice Versa.—This requires two or three persons, and a fourth may be of advantage in some circumstances. In a war hospital there is usually plenty of help to be had at the time of transferring patients.

(1) Assume the stretcher to be on wheels and of the same height as the bed. Pull the bed out and a little to one side; place the stretcher at right angles to the bed, the head being toward the bed (Fig. 13). The two persons

who are to do the lifting stand inside the angle. One person grasps the upper part of the patient's body, one arm being under his shoulders—into the armpit on the other side—the other arm well under the waist. The second person places one arm just below or at the buttocks and the other at the knees. A third person may be needed to support an injured leg or arm. At a signal the two persons lift in unison, take one or two steps backward and to the side, so as to come alongside the bed where the patient is to be deposited.

(2) If there is a low stretcher of the usual army type for carrying the wounded—one with very short legs, practically on the ground—three persons are needed. Bring the stretcher alongside of the bed and rest it on the edge. The two stretcher-bearers stand at the side and, supporting the stretcher with one knee and one arm, lift the patient as much as possible with the other arm, one at the patient's shoulders, the other at his thighs; the third person, standing on the opposite side of the bed, reaches across it, puts both hands well under the patient's hips, and assists in transferring him.

(3) Or the stretcher may be placed, patient and all, on the bed, the patient lifted from it by two persons, while the third removes the stretcher, permitting them to deposit the wounded man on the bed.

(4) If, as often happens where a building has to be adapted for hospital purposes, the stretcher cannot be brought to the bed, but must be set down on the floor at a little distance or in the hall, four persons are needed in order to avoid hurting a patient if he is much wounded. They proceed as follows. Three stand on one side of the patient (Fig. 14), kneel on the left knee, pass their hands beneath him—at shoulders, hips and knees (Fig. 15), and with the help of the fourth person on the opposite side, who also takes the hips, lift him to their knees (Fig. 16); as they rise with their load the fourth person removes the stretcher; at a signal he is carried to the bed and deposited.

In a great number of cases all that is needed is support of the injured part while the soldier lifts himself

Fig. 14.—Transferring patient from low stretcher to bed. First position.

Fig. 15.—Transferring patient from low stretcher to bed. Second position. Bearers kneeling to lift the patient.

quickly and easily from the stretcher to the bed, or vice versa.

Getting into Chair.—In getting a patient for the first

time up into a chair, he should sit on the edge of the bed and drop his feet to the floor, then, with the nurse holding him firmly under the arms and lifting slightly, he may swing himself off the bed and into the chair, which has been placed as close as possible. If there is an injured leg it must be supported during the transfer.

Putting back to bed is the reverse of the above process, but is more difficult, as the bed is usually higher than the chair, and some lifting is required to pull the patient up to

Fig. 16.—Transferring patient from low stretcher to bed. Third position. Patient lifted on the knees.

its level. Soldiers, however, help themselves as civilians cannot.

Slipping down in bed is always a serious symptom, as it indicates great weakness and low vitality. Two nurses are needed to pull a man up in bed; one stands at each side, each places one hand under the shoulder and the other under and slightly below the buttock; at a signal they partly lift and partly pull the patient toward the head of the bed.

How to Give a Rub.—A good rub is most appreciated by a tired or restless patient, especially a medical case. To give a good rub takes skill and practice; the touch is all-important; it should be light yet firm. For arms and

legs use both hands in rubbing; on the chest and back usually but one. The stroke should be rather long, not too quick, firm enough to stir the circulation, yet light enough to glide over the skin without pulling. Forget the skin as far as possible, except that you are not to pinch or pull it; use the whole hand, palm and fingers, grasping the flesh as you rub. Think all the time of the muscles and blood-vessels and endeavor to reach and stir them.

Getting Patients Ready for the Night.—Bed patients should be made ready for the night as follows: (1) Loosen the bedding at the sides and brush out all crumbs and loose dirt, having the patient move, lift, or turn as the case may be, so that you may find every bit. Crumbs under the back are most uncomfortable, and are a common cause of irritation and bed-sores. (2) Loosen the lower sheet and pull it smooth—and the draw-sheet and mackintosh if they are used—being quite sure that not a wrinkle remains. (3) Rub the patient's back gently but thoroughy with alcohol, followed by talcum powder (or whatever the hospital provides). The lower part of the back, over the sacrum, is the most important. Try to relieve the tiredness of lying all day and to stir the circulation. (4) See that the shirt is smooth under the back and that the pillow is comfortable. (5) See that a urinal is placed within reach unless there is a night orderly who makes frequent rounds. (6) Pick up and put away all articles not in use during the night.

Practically the same routine should be carried out in the morning for bed patients Much rubbing and a clean, smooth bed are the best preventives of bed-sores and the greatest factors in comfort.

CHAPTER V

TREATMENTS. DIET

EXTERNAL APPLICATIONS

Dry heat is a common means of relieving pain. It may be applied by means of rubber hot-water bags, metal cans, stone or glass bottles, hot bricks or stones, heated

Fig. 17.—Closing hot-water bag.

porcelain plates, bags of hot salt or sand, etc. Rubber hot-water bags should have the air pressed out of them before the stopper is screwed in, so that they will lie flat (Fig. 17). Stone or glass bottles should never be filled

more than three-fourths full, as the cork may be pushed out by the steam, the bed wetted, and the patient burned.

Moist heat, or **fomentations,** are applied by means of a compress of several folds of thick woolen cloth wrung out of hot water, placed next the skin, and well covered to retain the heat. (It is almost useless to try to use cotton material for a fomentation, as it holds heat for only a few minutes.) A piece of old blanket is best. Fold the

Fig. 18.—Wringing fomentation in towel.

compress in a towel, place in a basin with the ends out, pour very hot water over it, grasp the ends and twist them to wring the compress (Fig. 18). Carry the fomentation, still wrapped, to the patient's bedside, expose the part of the body upon which it is to be placed, open and unroll the compress to the required size, test its heat with the back of your hand or the inside of your arm, and put it on as hot as the patient can endure it. Cover it quickly with a piece

of some impervious material—oiled muslin, light rubber sheeting, etc.—and over this place a folded bath towel. See that the corners of the fomentation do not drip.

If a fomentation is applied around a limb or joint it should be wrapped from the bottom up, the rubber or oiled muslin being spread underneath, the hot, moist flannel upon it, brought up and fastened; if wrapped from above downward it is sure to drip and wet the bed.

A fomentation may be kept hot for a long time if a rubber hot-water bag—less than one-half full, so as not to be heavy—is placed over it; care must be taken that it does not burn the patient, and such an arrangement must never be used except with a person who is in good condition; unconscious, paralyzed, or very ill patients are easily burned.

If the fomentation is to be renewed, do not remove it until a fresh, hot one is at hand ready to be placed. Make the exchange as quickly and deftly as possible.

When fomentations are discontinued, dry the part thoroughly with a towel and rub it with alcohol to prevent chilling.

Hot dressings are prepared and applied as are fomentations, except that they must be made and kept sterile. A thick, sterile dressing is wrapped in a clean towel, boiling water poured on it, the basin placed over the fire and the water allowed to boil for a few minutes. In applying do not touch the inside of the dressing, the part which comes upon the wounds. Cover with waterproof material. Renew as ordered.

Poultices.—Linseed (flaxseed) meal is the material most commonly used for poultices. They should be made amply large and thick so as to hold their heat. The poultice cloth should be too large rather than too small, of two thicknesses of gauze or one of very thin muslin. Use a good-sized saucepan for cooking the poultice; have the water boiling and stir into it the linseed meal, sifting it through the fingers to avoid getting lumps. When it drops from the spoon without stringing it is done. Re-

move from the fire and beat well with the spoon for a minute or two to make it light. Spread thickly in the center of the cloth,[1] fold the edges up to enclose the poultice, roll it in a towel, and carry to the patient.

Poultices must be changed often enough to keep them thoroughly warm—one-half hour to two hours. A cold poultice does harm. After poulticing is discontinued wash the surface with clear or soapy water, dry, and rub with vaselin or olive oil.

A **mustard poultice** is made with water that is merely lukewarm, as hot water volatilizes the oil which is the essential principle. Mix thoroughly in a bowl about one-fourth ground mustard and three-fourths flour, dry; be sure that there are no lumps of the mustard or they will cause burns. Stir in the water until you have a paste that will spread nicely. If vinegar can be had, use it in place of the water, as it keeps the mustard from blistering. Spread the paste on a cloth or gauze thinly, fold in the edges, and it is ready to apply.

A mustard poultice is left in place fifteen to thirty minutes, until the skin is well reddened. When removed sponge the place with warm water, dry, and rub with oil or vaselin.

Mustard leaves—*i. e.*, ready prepared plasters—need simply to be wetted in lukewarm water and applied to the skin. If the skin is sensitive place a layer of gauze between it and the plaster.

Tincture of **iodin** is often used as a *counterirritant* to draw blood to the surface away from an inflamed area. It is painted on the skin with a soft brush or with an applicator made by twisting a bit of cotton on the end of a tooth-pick, a match, or a probe. Do not use it too wet; paint with long even strokes, covering the surface entirely. Allow it to dry before the clothing is put over it.

Cold Applications.—If ice can be secured, an ice-bag is the best method of applying cold. Crush the ice by

[1] Do not spread a poultice on metal or marble, nor on a polished wood surface, but use an unfinished piece of wood or table.

wrapping it in a strong piece of canvas or other heavy cloth (a towel is ruined by such a procedure) and pounding it with a hammer or against a stone or brick wall. Put a thin towel or cloth between the ice-bag and the skin.

Cold compresses are of two sorts: One a cloth wrung out of ice water, covered thickly, and bound in place; it very soon becomes, of course, a warm compress. The other, a thin cloth wrung out of cold water, placed on the part to be treated, left uncovered, and changed often enough to keep it cold. Very frequent changing—*i. e.*, every few minutes——is necessary. A patient can often attend to this himself or another patient can do it for him.

Enemata, or rectal injections, for the purpose of unloading the lower bowel, may be given by the orderly if he is trained, or by the nurse. For a simple enema, soapsuds made with laundry soap is commonly used. Prepare about 3 pints of the solution, making it comfortably warm to the hand. Use a short, hard-rubber rectal tip, or a long, soft-rubber rectal tube, whichever is ordered. Take with you a bed-pan.

Hang the can or bag of solution rather low, have the patient turn on his left side if possible, anoint the tube with vaselin, release the shut-off, and let the water run through the tube into the bed-pan until it comes warm; close the shut-off, lift the bedding and the patient's shirt far enough for you to see the rectal opening (anus) and gently insert the tube. (The patient may do this for himself if he can reach and you are sure he understands what is wanted.) If the tip is hard rubber, push it in as far as it will go; if soft rubber, insert it about 6 inches. Release the shut-off and ask the patient to tell you if he feels the solution running into the bowel. Let it run very slowly; if there is distress, stop it for a moment; continue giving small amounts slowly until a pint or more has been taken. Bear in mind that unless a considerable quantity of fluid is introduced the desired result will not be secured. A common fault is to give an enema too rapidly, causing distress and forcing the patient to expel

it before he has taken enough to be effective. When a proper quantity is taken, close the shut-off and withdraw the tube. Ask the patient to retain the enema for a few minutes if possible in order to permit it to work up into the bowel. Then give him the bed-pan.

Some hospitals use the Davidson or bulb syringe (Fig. 19) for giving enemata. In this case put the soapsuds into a deep basin. Insert the rectal tip, place the other end

Fig. 19.—Bulb syringe.

of the apparatus in the basin and gently pump with the bulb until the required amount is taken.

Placing and Removing Bed-pan.—A bed-pan should if possible be warmed before being given to a patient. Most men will place the pan for themselves, but very ill patients will need help. Put the hand under the lower part of the back, have the patient bend the knees if possible, and lift with the patient's help; slide the pan into place before you release your hand, letting the patient be the judge of its position. In removing a bed-pan always put the hand under the back, so that the skin shall not be pulled or bruised.

With men wounded about the upper thigh or buttock, the bed-pan may be more comfortable if placed sideways or reversed.

DIET

Serving Meals.—In war hospitals meals are served by the orderlies or by convalescent patients. Patients who can walk go to a common table. For bed patients the dishes are distributed beforehand—usually a plate, bowl, knife, fork, and spoon. A towel is used in place of a napkin. The food is passed and served direct from the

kitchen containers, soup being brought in a pail, meat in a baking pan, vegetables in a covered kettle, etc. In this way the food arrives hot and palatable, even though it may have to be brought a considerable distance. The nurse should see that the salt is passed.

Kinds of Diet.—Three classes of diet are usually recognized: liquid, special, and ordinary.

Patients on *liquid diet* should be fed often, at least five or six times a day, and twice at night. The nurse should see that a sufficient amount of food is actually taken and that it is of a really nourishing character. The following liquid foods are excellent if they can be obtained:

Thick soups of almost any sort,
Milk, cold or hot, not boiled,
Cocoa or chocolate made with milk,
Malted milk,
Egg-nog, made without liquor, except by special order, but with vanilla, lemon, chocolate, or other flavor,
Gruel of any sort, made with or without milk,
Egg lemonade,
Buttermilk,
Koumyss.

Tea, coffee, lemonade, etc., do not count as nourishment, though they are usually allowed.

Special diet usually includes:

Eggs, poached or soft boiled,
Milk toast,
Cereals, cooked,
Gelatin preparations,
Custards, boiled or baked,
Simple puddings, such as bread, rice, sago, tapioca, cornstarch, etc.,
Chicken,
Oranges, apples, or stewed fruits.

Regular or *ordinary diet* consists, in strictly military hospitals, of army rations with a few extras. In any case, it is usually plain, wholesome, and sufficient. It includes: meat (once or twice a day), bread, rice, potatoes, other

vegetables when obtainable, sometimes eggs or fish, stewed dried fruit (rarely fresh), etc.

Wounded men are practically always on ordinary diet. The sick are those on special or liquid diet.

Feeding Patients.—Very ill patients must be fed. If the food is liquid, it may be given through a bent glass tube or a straw or by means of a feeding cup (a covered cup with a spout), or the patient may drink directly from a glass or cup if it is not more than half full.

In feeding, prop the patient's head and shoulders up a little with the pillows and spread his towel smoothly under his chin. Do not give too large mouthfuls, and watch that the spoon does not drip.

A patient whose right arm is disabled may feed himself if his food is cut up and prepared for him. Or, another patient may be willing to do this, or even to feed a comrade; but the nurse must see that he himself does not get a cold meal in consequence.

Watching Appetite.—Sick patients—*i. e.*, those in medical wards—may not have an appetite and may need to be urged or coaxed to eat. It is the nurse's business to see whether the patient is getting sufficient food. If he is not, it should be reported; she should at the same time endeavor to secure articles of food that he fancies.

CHAPTER VI

PULSE AND TEMPERATURE. MEDICINES AND SOLUTIONS

Pulse, temperature, and *respiration* are called the three vital signs. Of these, pulse is the most important. In diseased conditions all three may be affected; in wounds, not necessarily.

Pulse.—Every beat of the heart sends a wave or impulse through all the arteries. This wave is called *pulse.* When an artery lies near the surface one can feel the pulsation and so judge of the quality and frequency of the pulse.

Pulse-rate is **modified** by *age,* being faster in children and slower in old persons; by *position,* being slower while lying down, faster when standing; by *exercise;* by *emotion;* by *temperature,* it increases 10 beats per minute to each degree of temperature; by *disease,* and by *personal peculiarity,* some persons having a naturally slow or fast pulse.

A pulse-rate of *70* beats per minute is considered *normal* for men, *80* for women. However, pulses of 50 to 60 are common among men, even young men. A pulse of 40 is very unusual. A pulse-rate of 100 should be reported. One of 120 is alarming. Pulse rarely goes higher than 150.

Quality of pulse is more important than rate. It requires experience to judge of quality, but the nurse should lose no opportunity to gain that experience; she should not take a pulse without observing its quality as well as its rate.

The points to be observed are force, volume, tension, and rhythm. Pulse may be full, thin, hard, compressible, weak, bounding, soft, wiry, thready, vigorous, sluggish, etc. Pulse is *irregular* when the beats vary in force and

length; this may be discovered by counting by quarter or half minutes and noting whether each is the same; it should be reported if found. Pulse is *intermittent* when beats are dropped or omitted; it should be reported. If the beats are not distinct, report it.

For convenience, pulse is taken at the *radial artery.* (It may also be counted at various other points, as in the temporal artery, the facial, the carotid, etc.) Feel for the wrist pulse just below the root of the thumb, placing the first two fingers over the artery (Fig. 20). See that

Fig. 20.—Counting pulse.

the patient's hand and arm are relaxed and lying comfortably, not held up or on a strain.

Temperature, or bodily heat, does not depend upon external conditions, but upon internal. It is the result of the balance between the chemical reactions taking place in the tissues, muscular action, etc., and the loss of heat by radiation, evaporation, etc.

Normal temperature is about 98½° F. or 37° C. It is slightly higher at night than in the morning.

Temperature varies very little in health—not more

than a degree—and only about 10° F. in disease (Fig. 21). *Subnormal temperature*, indicating a lowered vitality, is from 94° to 98° F. *Temperature above normal* indicates an active process of disease; 101° or 102° F. is considered fever; 104° F. is alarming. Temperature rarely goes above 105° F.[1]

For convenience, temperature is taken by the *mouth*, the bulb of the thermometer being placed well under the tongue and the lips kept closed for the required time, one to five minutes. It may also be taken in the armpit (axilla), though this is less accurate. If so taken, one must be sure that no clothing touches the thermometer bulb, and that it is well up between the arm and the chest. *Axillary temperature* is about ½ degree lower than that of the mouth. Temperature taken by *rectum* is usually the most correct.

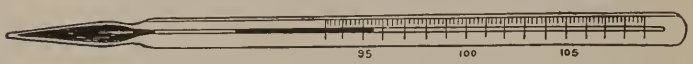


Fig. 21.—Clinical thermometer (Pyle's "Personal Hygiene").

It is about ½ degree higher than mouth temperature. The thermometer should be oiled or vaselined and inserted gently for an inch. The patient may be permitted to do this himself if he understands what is wanted.

Clinical thermometers are made so that they remain at the highest point until shaken down; to do this, grasp the thermometer firmly between the thumb and two or three fingers, the bulb end being free and downward; give a quick, sharp wrist-jerk, repeating as necessary.

Keep thermometers in some disinfecting solution. Wash them in *cold* water before and after use.

Do not attempt to take a delirious person's temperature by mouth.

Do not take temperature without observing both pulse and respiration.

Temperature charts (Fig. 22) are graphic records of the course of a patient's temperature.

[1] In sunstroke it may be 109° or 110° F.

Respiration.—Normal respiration is 18 to 20 breaths per minute. Respiration slower than 14 per minute should be reported, also anything above 24; 35 to 40 is alarming. Below 10 is serious.

To count respiration watch the rise and fall of the chest or abdomen. Do not place your hand upon the chest nor

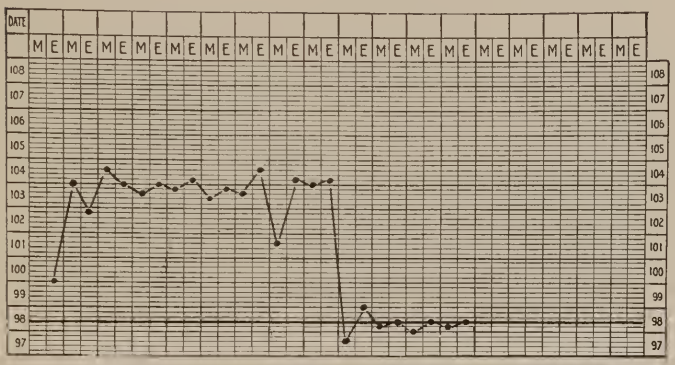


Fig. 22.—Temperature chart of lobar pneumonia (Paul).

let the patient know that you are counting, as it is almost impossible for one to breathe naturally when observed.

Quality of respiration should be noted, whether it is deep or shallow, regular or irregular, smooth or intermittent, easy or difficult.

MEDICINES

Ward *medicine cases* are supposed to be kept locked, and in any case patients are not allowed to go to them.

Giving medicines constitutes a definite responsibility; it is very easy to make a mistake.

To avoid getting the wrong medicine, do not attempt to remember either the bottle or its location, but always *read the label* of a medicine bottle or box *twice*, once as you reach for it and again after you have measured out the dose.

Liquid medicines should be poured from the side of

the bottle opposite the label, so that it shall not be soiled. A medicine-dropper or a "drop-bottle" may be used to measure small quantities of medicine.

Pills, tablets, etc., should not be touched by the fingers. Use a spoon, tip the bottle, and roll it gently to get the pill out.

A glass of water should always be offered with a medicine, whether it be liquid, pill, or powder.

Medicines of disagreeable taste may be followed by a bit of orange or a mouthful of bread.

When a number of medicines are to be given at one time, as in a large ward, some exact system must be established in order to avoid mistakes.

No one but a druggist or head nurse should take the responsibility of *relabeling* bottles of medicine.

A nurse should study the effect of the common drugs, so as to note whether or not they are accomplishing their object. Doctors will always be found ready to explain why certain drugs are being given.

Hypodermic Injections.—Drugs given hypodermically (*i. e.*, under the skin) act more quickly and surely than those taken by mouth.

Hypodermic tablets are specially prepared so as to dissolve readily. Liquids for hypodermic use often come in ampules—tiny sealed bottles, containing but one dose. If tablets are used, one should be very sure that she estimates the dose correctly.[1]

In giving a hypodermic injection strict surgical cleanliness must be observed, or an irritation, even an abscess, may result. Wash the hands, boil the syringe, the needle, and a teaspoon. (If the syringe has leather washers it

[1] A mistake may occur when one has not at hand a tablet of the exact dose ordered. For example, $\frac{1}{6}$ gr. of morphin may be ordered and only $\frac{1}{4}$-gr. tablets be on hand; one must therefore divide the tablet with great accuracy, or dissolve it in a measured amount of water and use only the required amount—in this case two-thirds. Or $\frac{1}{75}$ gr. of strychnin may be prescribed and the tablets available be $\frac{1}{30}$ gr.; in this case one must not become confused over the fraction, but remember that two tablets will be required.

must be sterilized by soaking in a disinfecting solution.) Take out the needle by means of the spoon, set it in a safe place with the point up. Fill the syringe about half full of the sterile water, place the correct tablet in the spoon, add the water from the syringe, and dissolve the tablet by gently shaking or stirring with the syringe point. Be sure that every particle is dissolved. Draw the fluid up into the syringe, fit on the needle, being sure that your fingers do not touch the point, but only the collar. Hold the syringe with the point of the needle straight up, and push the piston slowly until all air is expelled. Lay the prepared syringe on the table, with the point off the edge or wrapped in a sterile sponge, while you prepare the patient for the injection.

Choose a fleshy portion of the body, where there are no bones nor blood-vessels of any size. The outside of the arm

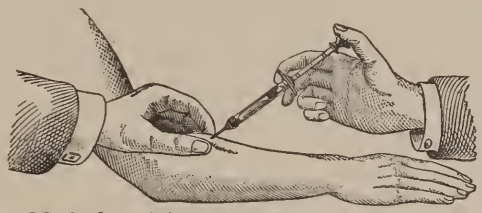


Fig. 23.—Method of giving a hypodermic injection (Thornton).

or thigh, the buttock, or the back are usually chosen. Scrub a small area with a bit of clean cotton wet with alcohol or iodin. Grasp the flesh firmly with the left hand, take up the syringe, and push the needle quickly into the flesh, preferably at an angle (Fig. 23). Then press the piston slowly to inject the fluid, being sure that every drop is given. Withdraw the needle and rub over the place with the alcohol or iodin sponge.

Clean the syringe by drawing up into it (1) sterile water and (2) alcohol or ether. Put a wire through the needle to keep it from becoming stopped with dust. Keep in a covered box.

The Nurse's Personal Medicine.—A nurse should not take drugs of any sort without the advice of her head nurse or a physician. *No nurse should administer to herself any pain-dispelling drug.*

WEIGHTS AND MEASURES

A knowledge of the simpler apothecaries' weights and measures is necessary if one is to give medicines or make up solutions.

APOTHECARIES' FLUID MEASURE

60 minims	=	1 dram (ʒj);
8 drams	=	1 ounce (℥j);
16 ounces	=	1 pint;
8 pints	=	1 gallon.

(The English pint contains 20 ounces.)

APOTHECARIES' WEIGHT

60 grains	=	1 dram.
8 drams	=	1 ounce;
16 ounces	=	1 pound.

(The English pound is 12 ounces.)

Equivalents.—A *minim* is considered the same as a *drop*. The drop is, however, a very uncertain quantity, as drops of different liquids vary greatly in size. A minim is an exact measure.

A *dram* is approximately a small *teaspoonful;* 2 *drams*, a *dessertspoonful*; 4 *drams* ($\frac{1}{2}$ ounce), a *tablespoonful*. None of these are exact measures

THE METRIC SYSTEM

In France and most of the European countries the metric system is used. It is also employed to a certain extent in the United States.

Weight:

10 milligrams	=	1 centigram;
10 centigrams	=	1 decigram;
10 decigrams	=	1 gram;
100 grams	=	1 kilogram or kilo.

Equivalents.—A *decigram* is about $1\frac{1}{2}$ *grains* apothecaries' weight. A *gram* is about 15 *grains*. 10 *grams* is about $\frac{1}{3}$ ounce. A kilogram or *kilo* is about $2\frac{1}{5}$ pounds.

Liquid Measure:

10 milliliters	=	1 centiliter;
100 centiliters	=	1 liter.

Equivalents.—Four milliliters make about 1 teaspoonful. A centiliter is about 2 teaspoonfuls. A *liter* is about 2 *pints* (1 quart).

Liquids are commonly estimated in **cubic centimeters.** There are *1000 cubic centimeters* in a *liter*, 500 in a pint, and so on.

One cubic centimeter of water weighs 1 *gram*.

Linear Measure.—100 centimeters make 1 meter. A *centimeter* is about $\frac{1}{3}$ inch. A *meter* is about $39\frac{1}{3}$ inches.

Solutions of various drugs are used in dressing wounds, in disinfecting, etc. They are made by *proportion* or *percentage*. This involves very careful estimation and measuring.

A 5 per cent. solution of javel is one having 5 parts of javel in 100 parts of water—*i. e.*, it is a 5 to 100, or a 1 to 20 solution; that is, one measures out 1 ounce of javel and adds to it 19 ounces of water.

For a 1 per cent. solution, of carbolic for example (1 to 100), one measures out 1 ounce of carbolic acid and adds to it 99 ounces (6 pints and 3 ounces) of water. (Note.—Carbolic does not dissolve readily and must be well shaken when making solutions.)

Solutions made from dry drugs which must be weighed are usually made up by a druggist. In some cases tablets of a certain weight are dispensed so that the nurse may make them up herself. For example, bichlorid of mercury is put up in $7\frac{1}{2}$-grain tablets. One of these dissolved in a pint of water makes a 1 to 1000 solution; in 2 pints of water, a 1 to 2000 solution, and so on. One must be careful, however, not to become confused in doing the estimating.

CHAPTER VII

OBSERVATION OF SYMPTOMS

Too much emphasis can hardly be placed upon the value of *exact and close observation* on the part of a nurse. The surgeon or physician sees the patient but a few minutes once or twice a day; the nurse is with him constantly. Most patients brighten up at the surgeon's visit; a few try to appear more ill than they are. In the hours between the medical officer's visits or during the night important changes may take place. The nurse must be able to see, note, and to a degree understand the significance of symptoms in order to know whether or not an occurrence is important or negligible.

It takes much experience to read symptoms or even to *see them correctly;* the nurse should get this experience as rapidly as may be. She should always be on the watch, and should ask her head nurse or the surgeon to explain what she sees.

She should learn to *state* her observations in exact language. It is not explicit nor very useful to say that a patient "seems queer," or that he "slept pretty well"; one should state in what way he seems unusual, how many hours he slept.

The auxiliary or nurse should be *chary of giving an opinion,* but should state only *facts.* There should, however, be as many facts as she can gather.

Classification of Symptoms.—Symptoms are of two sorts—*subjective,* those which the patient can tell you; and *objective,* those which you can see, or must see, for yourself. They are of equal importance.

In reporting subjective symptoms always repeat the patient's exact language.

General appearance is important. The best doctors lay

great stress upon it and find in it an aid to diagnosis. Form the habit of looking your patient over every time you come into the ward; in this way one may discover vital changes.

Facial expression tells much. A serene, contented look may be a hopeful sign when other indications are unfavorable; conversely, a pinched, anxious look is a danger-signal.

The color of the *lips*, the expression of the *eyes*, the line of *nostrils* and *mouth* are noteworthy. Note any puffiness under the eyes or in the lids, at what time of day it appears, and how long it lasts. Observe whether the eyelids twitch or quiver; whether the eyes respond instantly to light or whether they are dull and slow. Note the *pupils*, whether they are much contracted or dilated. Uneven dilatation is a serious symptom. Note the color of the white of the eye.

Note the **tongue,** its color, pale or bright red; the coating, its color and thickness; the shape of the tongue when it is held out, whether pointed or wide; whether it is steady or trembles.

Observe any dulness of **hearing,** and find out whether it is unusual. Soldiers are often temporarily deafened by the concussion of the big guns; if it does not clear up, it is important. The least pain in the ear should be reported, also any buzzing, ringing, etc.

Observe the quality of the **voice,** and try to discover whether any peculiarity is natural or indicative of illness. Remark any lack of response and try to discover its cause. If the patient cannot speak or talks indistinctly, try to learn the cause.

If there seems to be any difficulty in the *throat*, look at it, having the patient say "ah" or using a spoon-handle as a tongue-depressor. Report if anything seems unusual. Note whether the throat is dull or an angry red, is swollen or has spots upon it, and their color.

Cough should be described, whether ringing and dry or wheezy; whether easy or racking. Note at what time of

day it occurs most, and whether when lying down or sitting up. **Expectoration** should be noted, its quantity, color, whether it is stringy, frothy, thick, etc., also any odor. If there is any quantity of expectoration, show a specimen of it to the medical officer.

Note the **skin,** whether it is dry or excessively moist (profuse perspiration should be reported); whether it is warm or clammy; its color, a waxy white, yellow, mottled, or bronzed under the clothing.

Observe any **rash** or eruption. Note whether it is fine or coarse; its color, pink, red, or copper color; whether it disappears upon pressure; upon what part of the body it is and if the location changes; note whether it is a mere blush or is in pimples or pustules; find out whether it is painful or itches. Skin irritation may be due to clothing, to drugs taken internally or externally, to contagious disease, etc. It is important to know of its existence as soon as possible.

The **general condition of the body** should be observed, whether the flesh appears firm and well-nourished or is flabby or thin, etc.

Position in bed is important, especially in medical cases. A man who lies flat on his back is usually quite ill. Knees constantly drawn up may indicate abdominal trouble; in colic the patient may lie on the abdomen, as pressure relieves the pain. In pleurisy the patient lies upon the affected side of the chest; in lung tuberculosis, upon the sound side. In heart trouble of some sorts one cannot lie down with comfort. Persistent drawing back of the head suggest brain or spinal disease.

Pain should always be described. Find out whether it is sharp, dull, burning, boring, cutting, cramping, stinging, etc.; whether it is an ache, a soreness, a tenderness; whether it is deep or superficial; whether in one exact spot or extends over a considerable area; whether movement affects it. See if change of position, rubbing,[1] heat, or pressure

[1] If a leg or arm is painful along the inside, where the large blood-vessels lie, do not rub it. There may be a phlebitis (inflammation of the vein), when rubbing is a dangerous procedure.

relieves it; whether it is continuous or comes and goes. Ask whether the same sort of pain has been experienced before and under what circumstances. In headache, ask its location and whether it is a new symptom.

Chills are usually significant. Note their severity and how long they last (by a timepiece). Take the temperature as soon as a chill is over; if it is elevated, it may indicate a serious condition; if not, it may be a nervous manifestation.

During a chill cover the patient warmly, give him hot drinks, hot-water bottles, etc. When it is over remove the covers gradually, and if the patient has perspired dry him under cover and avoid drafts.

Convulsions are always serious. Not much can be done during a convulsion except to keep the patient from getting hurt. The pulse should be observed, the color of the face, etc. The length of the seizure should be noted by a timepiece.

The **amount of sleep** should be carefully estimated. Few patients are able to know how long they have slept. Note whether sleep is profound or light; whether quiet or restless; by what, apparently, it is disturbed; if it is broken, note the intervals. Learn to know whether or not a patient is really asleep; the breathing usually reveals this.

Special Symptoms.—Extreme restlessness is usually a serious indication. Picking at the bedclothes or persistent hiccup are danger-signals. Muscular twitching or jerking should be reported. A change in mental condition may be serious.

Nausea should be described; dizziness reported. Numbness, tingling, fainting, or faint feeling should be mentioned to the head nurse or doctor.

CHAPTER VIII

NIGHT NURSING. CARE OF THE DEAD

NIGHT nursing in a military hospital is much simpler than with civilian patients. A soldier sleeps despite a moderate amount of pain, and even if pain prevents his sleeping, he accepts it as "part of the game" and does not complain. He almost invariably hesitates to do anything which will disturb another patient, and rarely asks for anything that he can get along without.

The war nurse must be very keen and very observant at night or she will find men suffering acutely without her knowledge.

The Routine.—As soon as she comes on duty the night nurse must report to the nurse in charge of the ward and receive the orders for the night (they are usually written in a book) and any needed explanations or additional information. She should then make a round of the ward and speak to every patient who is still awake.

Lights should be put out at the prescribed hour and quiet planned for. Ventilation should be provided. Doors or windows which may slam should be tied or fastened.

In a large ward one dim light should be left and well shaded; or one may be arranged just outside, if it does not shine in any patient's face. If the nurse must sit in the ward, she should see that her light is well shaded. If there is a corridor or a toilet, lights should be left burning in them. A small portable light is necessary in making rounds.

Rounds.—A complete round of the ward or wards should be made at least once an hour. A sleeping soldier is not easily disturbed, and those who are awake are comforted by seeing their nurse even if they want nothing. Very

sick patients are naturally visited much oftener. Special patients may be given a hand-bell with which to call, especially if they are in rooms or at some distance from the nurse. One soon learns to listen for any call or rapping, to note a moan or restlessness, or any unusual sound.

Quiet.—The night nurse should wear noiseless shoes. High felt slippers are good, as one so often needs protection against cold. A pair of heavy socks put over the shoes will ensure both warmth and a quiet tread.

One should never whisper at night, as it is most annoying to everyone. A low, even tone, with distinct enunciation, is correct.

Relief.—The night superintendent arranges so that nurses may relieve each other for the midnight supper or that an orderly be left in the ward.

A **night orderly** is nearly always provided. He attends to bed-pans and urinals and helps with the morning work. When the orderly is at supper or has been sent on an errand the nurse does his work.

Reports.—New or alarming conditions should be reported to the night superintendent, who will decide what is to be done about them. If a doctor is needed, she will call him. In making reports be as definite and complete as possible. With serious cases have the night superintendent actually see the patient; she may observe important symptoms which you have entirely overlooked. *Do not take chances.* Get the reputation of being an alarmist rather than run the risk of a mistake or oversight. Matters are often a question of judgment; judgment is the result of experience, and years are necessary to learn all about the sick or wounded.

To Induce Sleep.—If a patient is wakeful and not in pain, a hot drink, especially hot milk, may send him off to sleep. Straighten the sheets and freshen the pillows. Change his position. Give him more fresh air. Or rub his back for a few minutes. If he complains of the wound hurting and the dressing appears to have slipped, readjust it yourself or call the night superintendent to do it for you.

With wounded men renew or wet dressings exactly on time, even if you must wake the patient for the purpose. If he has been sleeping badly, consult the night superintendent as to whether he most needs the sleep or the dressing. *With medical cases*, as in civilian nursing, an opposite rule holds good—do not waken a patient for medicine, treatment, or dressing unless by special order.

Morning work usually consists of taking temperatures, giving medicines, and seeing that patients are washed and ready for breakfast. There will always be some who cannot attend to their own toilet; the nurse must do it for them or see that the orderly or another patient does it. Soldiers are usually very ready to help one another.

Morning work has to be very carefully planned beforehand or one cannot get through on time. Get everything in readiness before you begin to waken patients, and then look for those who are already awake, leaving until last those who have had a bad night.

Everything used during the night must be put in its place and the ward left in order for the day nurses.

Morning Report.—When the charge nurse comes on duty in the morning the night nurse must make a report to her. This report is usually written, but some additional verbal explanation is required as a rule. The report should include all the important happenings during the night, any unusual temperatures or pulses, etc.

If the night nurse has not been able to finish her work before making the morning report she may do it afterward.

Care of Oneself.— Night nurses are prone to get too little sleep. Make it a rule to secure eight hours sleep every day; remain in bed during that period even if not sleeping. Without proper rest one cannot stand night work.

Some outdoor exercise every day, no matter what the weather, is advisable.

The night nurse should be especially careful of her diet, eating only wholesome food. Night work, being abnormal, readily causes digestive disturbances.

Do not do too much fine sewing or embroidery nor read-

ing of fine print in your spare time on duty. Search for coarser print or easier work. Be sure that your reading light is sufficient.

CARE OF THE DEAD

A nurse should always be present when a patient dies. The medical officer in charge of the ward must be notified of the death through the night superintendent.

If the orderlies are trained, it is customary for them to care for a dead patient; if they are not, the nurse must do it. The bed should be well screened.

The eyes should be closed; if they do not remain so, place a tiny bit of paper or a speck of absorbent cotton under the upper lid.

Wash the entire body with soap and water, getting assistance in turning it over. Pack cotton into the rectum (using forceps) to prevent any discharge escaping; wrap the genitals in gauze. See that the wound has clean dressings and bandages; these need not be sterile. Fasten the ankles together, also the wrists, with broad bandages, but do not draw them tightly enough to leave marks. Bandage the jaw to keep it from falling.

Wrap the body in a clean sheet, shroud, or whatever is provided. The night superintendent will direct the details and probably inspect the result.

A dead body is usually removed from the ward as soon as possible, so the work must be quickly done.

CHAPTER IX

BACTERIOLOGY. SURGICAL CLEANLINESS

Bacteria (sing. *bacterium*), also called microbes or germs, are living bodies belonging to the vegetable kingdom.[1] They are microscopic in size. Many bacteria are beneficial, but others are the cause of disease; these latter are called *pathogenic—i. e.*, disease producing.

A small number of bacteria do not necessarily produce

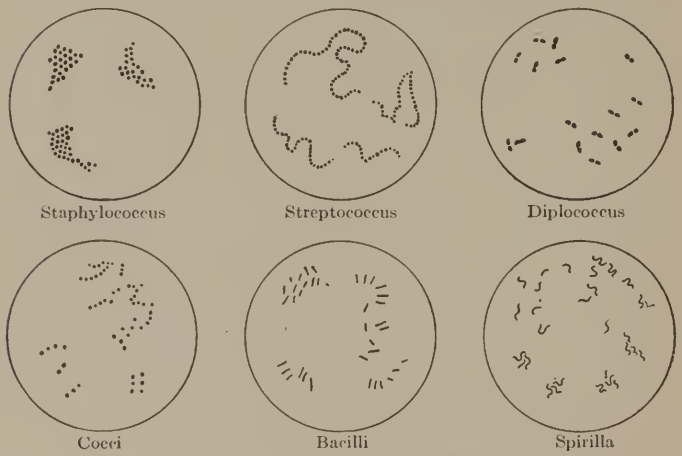


Fig. 24.—Three forms of bacteria.

a diseased condition, because all living tissues have a definite resistance to bacterial invasion. Only when the germs are in considerable quantity, are very virulent, or find especially good soil and living conditions is the disease produced.

Bacteria are classified according to their shape, the *cocci*

[1] The slang term, "bugs," is incorrect in origin, since microbes are not animals, but plants.

being round, the *bacilli* being rod shaped and the *spirilla* spiral (Fig. 24).

Some of the round bacteria cling together in the form of chains (streptococci), some like bunches of grapes (staphylococci), some in pairs (diplococci) (Fig. 24).

Bacteria are named from some quality which they possess (the *Bacillus pyogenes* produces pus); from the disease which they produce (the *Bacillus tuberculosis* is the cause of tuberculosis, the *pneumococcus* of pneumonia, etc.) or from the discoverer (the *Klebs-Löffler* bacillus, that of diphtheria, was discovered simultaneously by two men); or from their habitat (the *Bacterium coli* inhabits the human colon).

Conditions of Growth.—Bacteria, since they belong to the vegetable kingdom, require for life and growth exactly what plants do—*warmth*, *moisture*, and *suitable soil*. The human body is always warm and moist, and certain tissues are good soil for certain germs. Some bacteria, as those of diphtheria, gonorrhea, etc., prefer the mucous membranes; others, some other tissue.

Most of the germs which attack the human body require a certain amount of air. A few are *anaërobic*—*i. e.*, flourish in the absence of air, as those of tetanus (lockjaw) and gas gangrene.

Infection.—Germ diseases are usually *communicable*—*i. e.*, they may be carried from one person to another. This is termed *infection*. Certain infections occur through a wound (a cut, abrasion, scratch, a tear, a compound fracture, etc.), as "blood-poisoning" (septicemia), lockjaw (tetanus), etc. Others occur through the intestinal tract, as typhoid (also called enteric), dysentery, and perhaps tuberculosis. Others are through the mucous membranes, as diphtheria, pneumonia, scarlet fever, possibly measles, gonorrhea, and syphilis. Pulmonary tuberculosis and grippe (presumably) occur through the air-passages.

Modes of Infection.—Typhoid and dysentery are carried into the system by food or water. Gonorrhea and syphilis

are usually acquired by direct contact, though syphilis may be carried by utensils. Diphtheria, pneumonia, colds, etc., are by "droplet" infection—*i. e.*, the bacteria are contained in the small drops which spatter out during coughing, sneezing, etc. Wound infection takes place from *dirt* of various sorts getting in, from unclean instruments, utensils, and from germs carried by *human hands*. In fact, almost any disease which is communicable is more often than not carried by the hands. We handle unclean articles, then handle doorknobs, food utensils, shake hands, etc., and by this means transfer to other people the germs which we ourselves have acquired. Only careful habits and frequent and thorough cleansing of the hands can obviate these difficulties.

A **wound is known to be infected** when there is pain, redness, swelling, and discharge of pus. Infection may be *local*, in the wound; or in the surrounding tissues; or *general*, throughout the body. It may spread by means of the lymphatics, or the germs may be carried by the blood-stream. A general infection is called *septicemia*.

When a wound occurs the white blood-corpuscles immediately gather there and an organized battle against infection begins. The white cells eat up or destroy as many bacteria as possible; if there are enough of them, they gain the upper hand and the infection "takes care of itself," that is, comes to nothing. If, on the other hand, the wound has much dirt in it or many harmful germs they may overcome the white cells and an infection takes place, usually with the formation of pus. *Pus* is composed chiefly of a mixture of the white corpuscles (modified) and bacteria.

An **abscess** is a collection of pus, the result of infection and inflammation.

Sepsis means infection—the presence of harmful germs.

Aseptic means free from harmful germs.

Germicides or *disinfectants* are substances which kill germs.

Antiseptics stop the growth of germs, but do not neces-

sarily kill them. In actual practice the terms "antiseptic" and "disinfectant" are used as synonyms.

Sterile means free from germs of all sorts.

Sterilization is the process of rendering a thing free from germs. There are several methods of accomplishing this:

(1) *Boiling* for ten minutes—*i. e.*, exposing the articles to be sterilized to a moist heat of 212° F. (100° C.)—is one of the easiest and most effective modes of sterilization. It can be applied to instruments, utensils, rubber gloves, clothing, surgical dressings, etc.

(2) *Steam under pressure—i. e.*, exposing materials to steam at a temperature of 240° to 250° F.—is another method. It is usually continued for from one-half to one hour, according to the apparatus and the materials to be sterilized. One must be sure that the steam, or at least the high degree of heat, penetrates to every portion of the articles. This method is used chiefly for clothing and dressings, but is applicable to instruments, solutions, etc.

(3) *Dry heat—i. e.*, baking at a temperature of 300° to 400° F.—is also efficient, but there are few things to which it is applicable.

(4) *Flaming.—i. e.*, holding directly in a flame for one-half minute or burning alcohol in or on the object to be sterilized—is an excellent method. It is suited to instruments and basins.

(5) *Soaking in a disinfectant solution* is efficient if properly done. The length of time required depends upon the strength of the solution used and upon the character of the material to be disinfected. The common mistake is to make the solution too weak. One-half hour to two hours is required with a proper solution. This method is applicable to utensils, clothing, and discharges. For discharges, such as sputum or feces, strong solutions and long contact is necessary in order to be sure of an effect. (Some disinfectants, such as bichlorid of mercury, are not suitable, as they do not penetrate the discharge.)

(6) *Mechanical cleansing* is applicable chiefly to the hands. A soft brush or piece of gauze is used to remove the

bulk of the dirt. The process is usually finished by soaking for a minute in an antiseptic solution or washing in alcohol. In hand-scrubbing the brush should be clean—*i. e.*, have been boiled or soaked in disinfectant; the fingernails (which should always be kept short) must be most carefully cleansed by a nail-file or stick and much of the scrubbing time should be spent on them. All four sides of the fingers and the spaces between them should be scrubbed. The palms and backs of the hands, also the wrists, should be well cleansed with the brush or with gauze.

(7) *Burning* is one of the best means of destroying matter which contains harmful germs. It is suitable for soiled dressings, sputum, or for other discharges if the quantity is small.

All materials and instruments or utensils *used in dressing wounds should be sterile*—*i. e.*, germ free. This applies to both clean and infected wounds.

CHAPTER X

BANDAGES AND BANDAGING

Bandages are used (1) to keep dressings in place over wounds; (2) to give support; (3) to apply pressure; or (4) to prevent or limit motion.

The bandages in common use are the *triangular*, the *roller*, and the *many tailed*.

Bandages are made of cotton cloth, firm gauze, tarletan, crinolin, etc.

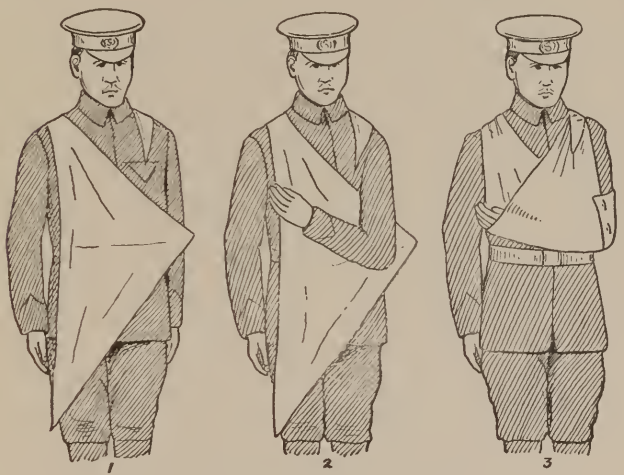


Fig. 25.—How to adjust an arm sling.

The **proper application of a bandage** requires a degree of skill which is attained only after considerable practice. A correctly applied bandage should be neither too tight nor too loose, and should remain in place for twenty-four hours without readjustment with the patient moving about as is necessary.

An uncomfortable bandage is not properly applied.

A bandage which slips out of place with ordinary movements is not properly applied.

A neat-looking bandage is not necessarily a correct one. Firmness should not be sacrificed to appearance.

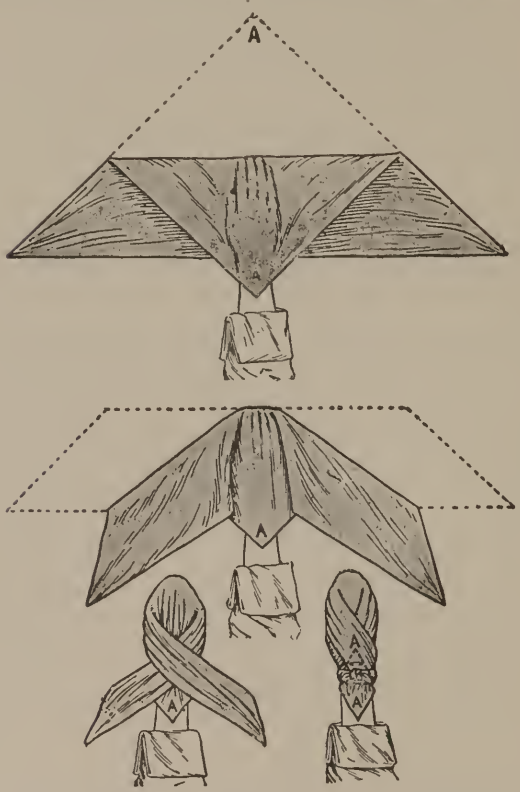


Fig. 26.—The triangular bandage applied to hand (Warwick and Tunstall).

THE TRIANGULAR BANDAGE

This is made by folding a square of strong muslin diagonally and cutting along the fold. The raw edges should be hemmed.

The triangular bandage may be made large or small, according to the use to which it is to be put.

As an **arm sling** (Fig. 25) the triangular bandage should

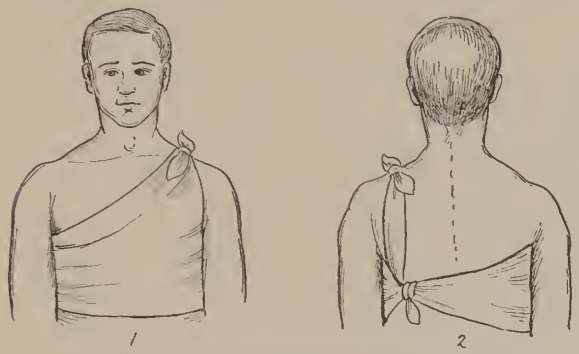


Fig. 27.—Triangular bandage applied to chest.

be put on with the right-angled corner at the elbow and applied as in the illustration. The two slender ends go on either side of the head and tie. The point at the elbow

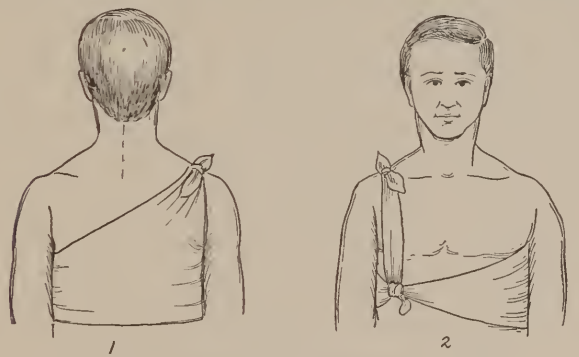


Fig. 28.—Triangular bandage applied to back.

should be folded over and pinned neatly. The bandage should be fastened high enough to afford firm support to the arm.

A small triangular bandage may be used for the **hand,** as illustrated (Fig. 26).

The triangular bandage is applicable to the **chest, back,** or to the **foot** (Figs. 27, 28, 29).

For the **head,** it may be put on bandana fashion, the ends crossed at the back, brought up, and tied in front (Fig. 30).

Fig. 29.—The triangular bandage applied to the foot (Warwick and Tunstall).

Fig. 30.—Triangular bandage applied to head.

It may also be used for the **hip** or **buttock,** though a many tailed is usually better.

A small triangular may be used on the knee (Fig. 31).

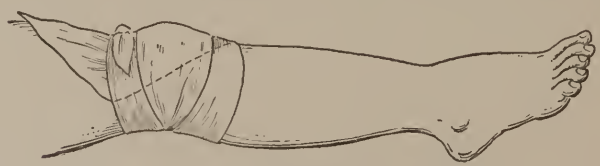


Fig. 31.—Triangular bandage applied to the knee.

THE ROLLER BANDAGE

Roller bandages are made of long strips of material, rolled into a tight, firm roll for convenience in applying. They are of (1) muslin, bleached or unbleached, when one wishes a firm bandage upon which some wear may come; (2) of gauze of a firm texture, when one wishes a snug-fitting but soft bandage; (3) of tarletan (very open gauze slightly starched), to afford slight support and prevent rubbing; (4) of crinoline, with or without plaster-of-Paris, for supporting bandages or plaster casts; (5) of flannel or flannelette, for special warmth, or for a bandage which shall limit the motion of a joint by its mere bulk.

Fig. 32.—Roller bandage.

Other materials are also used.

A roller bandage may be from ¾ to 8 inches *wide*, according to the material of which it is made and the part of the body to be bandaged. If it covers a bulky dressing it is wider than it would otherwise be. Its *length* is in proportion to the width or depends upon the material employed; muslin bandages of medium width are made 6 yards long; gauze, 10 yards.

A bandage should be rolled very tightly and evenly; there should be no loose threads at the edges; muslin bandages should have torn edges, not cut.

Rules for Applying Roller Bandages.—In general, use a bandage which is too narrow rather than too wide.

Start with the *outside* of the roll *next* to the body (Fig. 32).

Always bandage *from* yourself.

Keep the roll close to the part to be bandaged and unwind no faster than is necessary.

Begin bandaging at the part farthest away from the body—*i. e.*, with a leg, at the foot or ankle; with an arm,

at the hand or wrist. In bandaging the hand do *not* begin at the wrist, nor at the ankle for the foot.

As you begin, wind two turns around the limb to prevent the bandage slipping.

Let each turn of a bandage overlap two-thirds of the previous one, so that there will be three thicknesses covering any part. More turns than this may be used, but not fewer, or the bandage will not stay in place.

Leave finger-tips and toes uncovered. If the bandage is too tight and interfering with the circulation the color of the nails will be an indication; if they become blue, the bandage must be loosened.

Try to bandage firmly but not tightly. Endeavor to have the bandage make an even pressure, so that it shall not be loose at one place and cut into the flesh at another.

Have the part to be bandaged held in the position in which it is to be. The arm should usually be bandaged with the elbow bent. Neglect of this point may cause serious interference with the circulation.

Do not bandage the forearm without including the hand, nor the leg without including the foot; to do so is uncomfortable to the patient and may interfere with circulation.

Never let a bandage which holds a dressing come directly on the skin. See that there is gauze or cotton underneath it.

The **spiral bandage** (Fig. 33) goes round and round a limb, each turn being a little higher than the previous one.

Fig. 33.—Spiral reversed bandage of the upper extremity (DaCosta).

In order to make it fit, one must use **reverses.** These are made by placing the thumb or finger firmly on the bandage as you turn it over obliquely; this changes its direction (Fig. 34). Reverses should not be made over a *bony prom-*

inence nor over a *wound*. They are best at the outer side or back of a limb.

The **figure-of-8** (Fig. 35) is used in bandaging a joint and occasionally in other places. The bandage is wound

Fig. 34.—Bandaging a leg, showing method of reversing the bandage (Stoney).

Fig. 35.—Figure-of-8 bandage of the instep (DaCosta).

alternately above and below the joint, going back obliquely underneath. If properly put on, the joint may be moved quite freely without disarranging the bandage

Fig. 36.—Figure-of-8 bandage of the elbow (DaCosta).

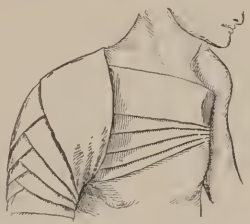


Fig. 37.—Spica bandage for the shoulder (DaCosta).

(Fig. 36). This bandage may be used on the hand, foot, ankle, knee, eye, or head.

A **spica** (Fig. 37) is a figure-of-8 with unequal parts. It is used for the shoulder, groin or hip (Figs. 37–40), and the thumb.

To cover in the end of the finger, for example, lay turns of bandage flat back and forth over the tip, three to five times, letting them come well down on the finger; hold them in place by turns of bandage around the finger (Fig. 41).

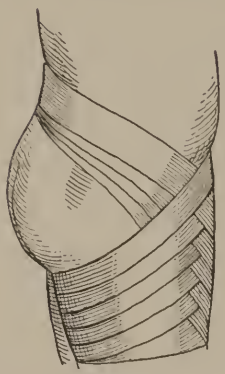


Fig. 38.—Spica for the hip.

Fig. 39.—Spica for the thumb (DaCosta).

The same method is used for covering the whole hand, the foot, or a stump where there has been an amputation (Fig. 42).

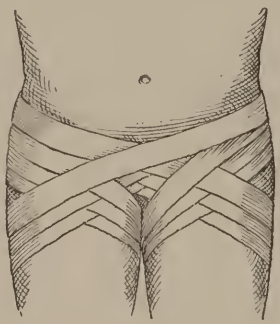


Fig. 40.—Double spica for the hips or groins.

Bandaging the **head** is always difficult, as it is necessary to include or exclude eyes, ears, nose, and mouth, as the case may be. Numberless modifications of any type of

bandage are necessary in order for the bandage to accomplish its purpose.

For covering the scalp the *capelline* bandage is excellent (Fig. 43). It is done with a double roller (or two sewed together). One roller goes round and round the head, the other back and forth over it, the round-and-round one crossing each turn and holding it.

Fig. 41.—Covering tip of finger.

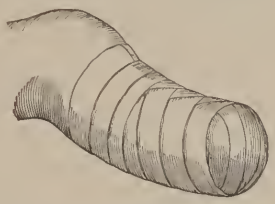


Fig. 42.—Recurrent bandage of a stump (DaCosta).

A figure-of-8 may be used to cover both eyes or may

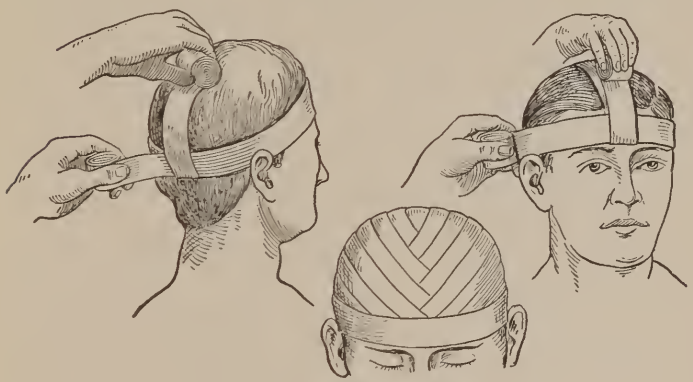


Fig. 43.—Capelline bandage.

be modified for one (Fig. 44). It may or may not include the ears, usually not.

A similar figure may be used to cover both ears or the forehead without including the back of the head. In some cases the bandage will hold better if there is a reverse put on either side.

Head bandages may pass under the chin, but not around the neck.

To **fasten** a roller bandage, turn the end under smoothly and pin with a small safety-pin; or split the end for several inches, tie, wind the ends around the limb in opposite directions, and tie in a bow-knot.

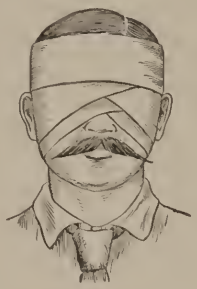


Fig. 44.—Crossed figure-of-8 bandage of both eyes (DaCosta).

Do not place a pin over a prominent bone or over a wound; on the head or back see that the pin is not put where the patient will have to lie on it.

Economize as much as possible with bandages, as they are expensive. Never cut a bandage which can be used again.

Do not cut off a bandage unless (1) it is soiled and too flimsy to be washed; (2) the patient will be hurt by the moving involved in unwinding it; or (3) time is of vital importance. (In most instances it actually takes no more time to unwind a bandage than to cut it off.)

To **remove a roller bandage,** gather it loosely in the hand as you unwind it, passing it from one hand to the other as you carry it around the limb.

THE MANY-TAILED BANDAGE

Many-tailed bandages (Fig. 45) are adjusted with more ease to the patient than are roller bandages. In some cases they stay in place better than roller bandages, in others not so well. They are especially good for holding wet dressings or poultices in place.

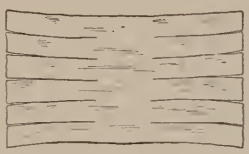


Fig. 45.—Many-tailed bandage (Stoney).

Fig. 46.—Scultetus bandage (Stoney).

The *scultetus* (Fig. 46) is a modified many-tailed, having the edges of the tails overlapping. This makes it stay in place better.

Fig. 47.—Four-tailed bandage applied to head.

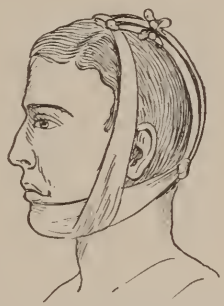


Fig. 48.—Four-tailed bandage applied to jaw.

The **four-tailed bandage** is useful for the *head* and the *jaw* (Figs. 47, 48). By making the tails narrow it may be

used for the *eyes* (Fig. 49). It is also applicable to the *knee, ankle,* etc.; in these cases it is brought around and back over itself to be fastened.

Fig. 49.—Four-tailed bandage for eyes.

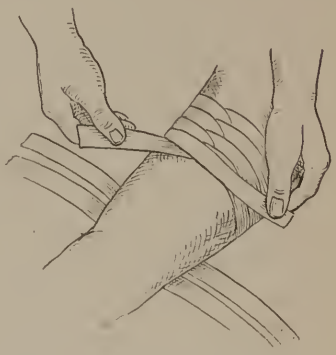


Fig. 50.—Applying many-tailed or scultetus bandage.

The **many-tailed** (better the scultetus) may be used for the *abdomen,* the two perpendicular tails passing between

Fig. 51.—T-bandage.

Fig. 52.—Split T-bandage.

the thighs; for the *chest,* back or front, the two perpendicular tails going over the shoulders. Without the special tails it may be used for the *thigh* or the *upper arm.*

To fit the scultetus exactly the tails should be lapped with a slight slant (Fig. 50); this makes the upper ones hold the under in place. Fasten with two or more safety-pins.

Specially shaped and fitted bandages with several tails are used for *hip* and *shoulder*.

The **T-bandage** (Fig. 51), so-called from its shape, is used chiefly in civilian work. The upper portion goes around the waist, the lower passes up between the thighs, the whole fastening with one pin. The split **T**-bandage (Fig. 52) holds dressings in place over the rectum or scrotum, the tails passing up each side of the genitals.

Plaster and **crinoline** bandages will be taken up in Chapter XIII.

CHAPTER XI

SURGICAL DRESSING MATERIALS

Surgical dressings are used over wounds chiefly: (1) To keep the wound clean—*i. e.*, to prevent dirt or infection from getting into it. (2) To keep some antiseptic material in contact with the wound or to hold drainage-tubes in place. (3) To absorb discharges. Dressings are also used for making pressure upon a wound, as in hemorrhage.

Absorbent gauze is the material usually employed for surgical dressings. A thin, sleazy quality is softer and better than the finer, firmer sort. It should be folded so that no raw edges or loose threads will come on the wound and so that the thickest part (if there is one) will be in the center. Gauze should be cut economically, as it is expensive.

Cotton wool, usually the absorbent variety, is used over the gauze—(1) to absorb discharges; (2) to make better occlusion; (3) for warmth; (4) over wet dressings. Cotton is less expensive than gauze. It should not be used next a wound, as it sticks badly.

Non-absorbent cotton (cotton batting) is used over the absorbent cotton to prevent discharges from soaking through. It is also used for lining or padding splints.

Other Materials.—*Lint*, a thick, soft, fleeced cotton material, is used in America chiefly for dressing burns; in England it is much used in place of gauze. *Oakum* pads are sometimes used outside a gauze dressing in large, foul wounds.

For **emergency dressings** any piece of cloth which is reasonably smooth, absorbent, and clean can be used. It should, if possible, be boiled before use to render it sterile. It may be used wet.

If nothing sterile is at hand, use the inside or cleanest portion of the material available, or the material may be

heated in an oven until it is slightly scorched and so sterilized. Scorched paper can also be used.

Freshly washed and ironed linen is practically sterile; use the inside.

Protective dressings of some impervious material are used over the gauze and cotton—(1) where there is much discharge; (2) when a hot dressing has been applied and one wishes to retain the heat; (3) sometimes over wet dressings. Oiled silk and oiled muslin or even oiled paper are used, or jaconet—a thin, light-weight rubber sheeting.

Adhesive plaster is employed: (1) To retain in place dressings which are difficult to bandage, or which can be made smaller and neater by this means, as on the face. (2) To promote absorption by pressure, as in swollen joints, etc. (3) For support, as in some sorts of fracture (of the ribs, for example), in back-strain, flat-foot, etc. (4) To limit the motion of a joint, in which case many overlapping strips are used. (5) To pull the edges of wounds together and hold them in place until they heal; in this case the plaster comes on or very close to the wound, and must, therefore, be sterilized; this is done by passing the strip to be used across an alcohol or gas flame, taking care that it is not burned; use narrow strips, so that any discharge from the wound may come away between them.

Adhesive plaster is expensive and often difficult to get; it should, therefore, be used as economically as possible. It is not economy, however, to use too short a strip for holding a dressing, as it is likely to slip off and so be quite wasted.

When strapping with adhesive or fastening a dressing, hold the end first placed tightly with the hand while the other end is being fastened.

When adhesive is applied directly to the skin over a surface of any extent the part should be shaved, otherwise its removal is very painful.

To remove adhesive plaster begin at each end and pull toward the middle, never from end to end.

Always remove adhesive *quickly*, as it hurts much less than if done slowly.

To clean the skin after the removal of adhesive use ether or benzine; sometimes alcohol will do. If an irritation is left, apply vaselin or cold cream, zinc-oxid ointment, etc.

Sponges are small bits of cotton or gauze used for cleaning wounds or soaking up discharges. Small pieces of cotton wet in some solution are often used. A dry sponge should usually be of gauze. Sometimes a ball of cotton covered with a layer of gauze is used.

The so-called **"combination"** dressings, made of a thick layer of cotton covered with one thickness of gauze to hold it in place, are much used over wet dressings.

Drains are used in deep wounds: (1) to keep the wound open, so that discharges may come away; (2) to promote the evacuation of any discharge, pus, etc.: (*a*) by capillary attraction or (*b*) by an open channel.

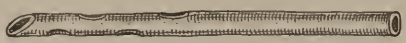


Fig. 53.—Rubber drainage-tube.

Drains may be of (1) *rubber tubing* in various sizes (Fig. 53); holes are cut at intervals in the end which is placed in the wound; (2) strips of gauze folded; (3) strips of rubber tissue folded; (4) tubes threaded with gauze; (5) gauze strips loosely wrapped in rubber tissue.

Drains must be carefully made. If gauze is used, no threads nor raw edges are permitted.

Sterilization.—All materials which are to touch a wound or come near it should be sterilized. This is usually done in steam-pressure sterilizers (see Chapter IX). Goods which are well wrapped remain sterile for a long time.

Dressings, drains, etc., which are to be used wet may also be sterilized by (1) boiling, or (2) by soaking in an antiseptic solution.

When dry dressings are used only the inner pieces need be sterile. For wet dressings all except the outmost layer must be sterile. Fluid soaking *out* from a wound makes a path for dirt or infection to travel *in*. This does not occur with dry dressings unless there is much discharge.

CHAPTER XII

WOUNDS. ASSISTING WITH DRESSINGS

Wounds are classified as follows:

(1) **Bruises** are wounds, strictly speaking, but they are not usually treated as such.

(2) **Abrasions** are slight wounds, the outer skin being scratched or rubbed off. They may be cleaned and dressed with a smooth, sterile dressing. Vaselin applied to the injured surface will usually make it more comfortable. If left uncovered, dirt may get in through an abrasion and an infection result. As a rule, however, abrasions seal themselves in with serum and heal under a crust or scab.

(3) **Incised wounds** are those made by a straight, sharp instrument. They may fall together of themselves or may remain open. There may be considerable bleeding from an incised wound, the amount depending upon the depth, size, and location of the wound.

If such a wound is an operative or surgical incision, made by a sterile instrument in a properly prepared area, it is clean—*i. e.*, not infected—and its edges may be brought together and sewed or strapped; it should heal quickly and without event.

If an incised wound is made by an instrument not surgically clean it is ordinarily sponged or irrigated gently to remove foreign matter and bacteria so far as is possible. A wound which bleeds freely is often washed out by this means. Such wounds are, however, considered as infected and are treated accordingly. If there is hemorrhage or excessive bleeding it should be stopped by appropriate means (see Chapter XIV). One usually leaves such a wound open, that it may drain and heal up from the bottom.

(4) **Lacerated wounds** are torn and irregular; a portion of the flesh may have been torn, pulled, or blown away. In some cases the whole limb may have been torn away, leaving a jagged stump. These are the most common wounds in war; they are caused by exploding shells, shrapnel, bombs, etc. There is not likely to be great hemorrhage unless large blood-vessels have been torn.

Such wounds are cleansed as best they may be by sponging or irrigation; any pieces of shrapnel or clothing which can be seen are picked out with forceps, hemorrhage is checked by the proper measures, and sterile dressings are applied. They are usually treated by wet antiseptic dressings and must fill in from the bottom. They leave large scars.

(5) **Contused wounds** are those caused by a blow with a blunt instrument. There is usually a large, bruised surface with a small open wound.

(6) **Punctured wounds** are those made by bullets or the stab of a pointed instrument, as a bayonet, dagger, etc. There is not much hemorrhage unless a large blood-vessel has been injured.

Punctured wounds are dangerous because the instruments which make them nearly always carry in dirt or infection; this may cause trouble deep in the tissues long after the external wound has healed. Tetanus (lockjaw) may develop in such wounds because its germ is anaërobic (*i. e.*, grows in the absence of air).

Antitetanic serum is usually given as a preventive.

Bullet wounds may be merely (1) *punctured,* having a wound of entrance only, in which case the bullet remains in the body; it may have entered in a straight line or have been deflected in its course by bones, or it may be (2) *through and through,* with two external wounds, the wound of *entrance* and the wound of *exit;* the wound of exit is usually the larger.

If a bullet remains in the body it is located by means of the *x*-ray, and may or may not be removed. If removal would necessitate cutting through or into important

tissues, it is often better to do nothing; nature covers in the foreign body with fibrous tissue, and it quite frequently makes no particular trouble.

If a bullet or other foreign body has penetrated a joint a permanent injury always results.

(7) **Compound fractures,** in reality lacerated wounds, are wounds complicated by broken bones (see Chapter XIII). They are the most difficult injuries with which the war surgeon has to deal, and they invariably require special treatment and apparatus. They are always infected and long in healing.

Healing of Wounds.—*Clean wounds* heal very quickly, sometimes in a few days, though the tissues are not solid in that time. *Infected wounds* are slow in healing, and may take weeks or months; the process is hastened by *keeping the wound clean*, by *drainage*, and by *the use of weak antiseptics* which kill or prevent the growth of the infecting bacteria.

It is a common practice to keep war wounds continually wet with an antiseptic solution. This is accomplished (1) by renewing a wet dressing frequently or (2) by the use of the so-called "Carrel" tubes (named from the inventor, Dr. Alexis Carrel of France).

Carrel tubes (Fig. 54) have a closed end and several small openings at the side; they are inserted directly into the wound itself. Fresh solution is poured into them at

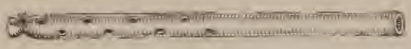


Fig. 54.—Carrel tube.

intervals, either by means of a hand-syringe or by letting it run from a bottle hung above the patient's bed (Fig. 55). In either case the wound is kept flushed out and wet with the desired solution.

Different **tissues heal** at different rates of speed, according to the amount of blood-supply which each has. Flesh or muscle is repaired rapidly, and the parts of the

body which have the most blood-vessels, as the face and hands, repair most quickly. Cartilage and bones have few blood-vessels and their repair goes on slowly. With

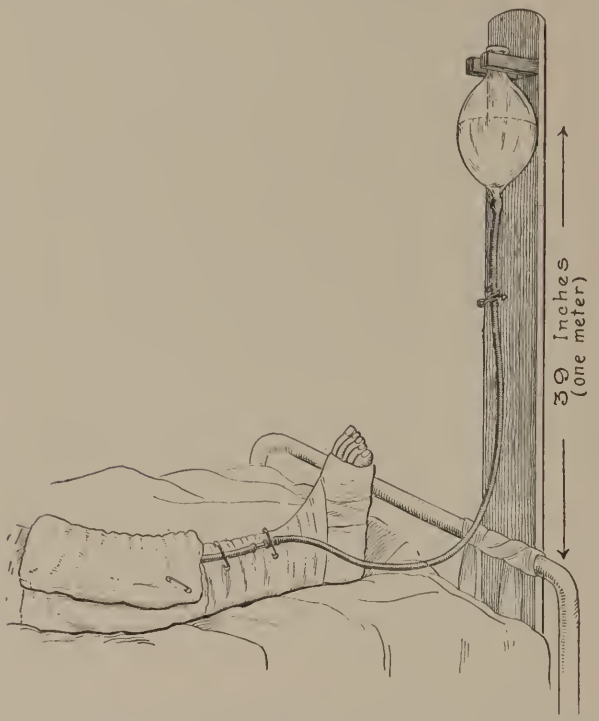


Fig. 55.—Showing Carrel method of irrigating wounds with the Dakin fluid (Keen, modified from Carrel and Dehelly).

muscle the healing is a question of days; with bones, of weeks.

Blood-vessels when injured heal, but are no longer useful. The circulatory system is a network which permits the blood to take a fresh route when the original one is blocked; in this way blood-vessels originally small may

become large after an injury, because they are carrying on a greater amount of work.

The **healing process** in any tissue **is retarded** or prevented by the presence of bacteria or infection. A wound may remain unhealed for weeks or months if it is not kept clean. Until the white cells are able to overcome the invading bacteria, until the building-up process goes on faster than infection and tearing down does, a wound will not heal. We therefore *dress* or clean and care for a wound in order to expedite the healing.

Fig. 56.—Repair of bone: 1, Periosteal callus; 2, medullary callus or dowel; 3, loosened periosteum.

Scars and Scar Tissue.—If two clean, smooth surfaces in a wound are brought together they adhere and heal; this form of healing is said to be by *first intention*, and there is practically no scar. In other cases the healing process necessitates some filling in between the torn or cut surfaces. This filling in is by *granulation*, the tissue being built up a cell at a time. The tissue so formed is usually fibrous or connective tissue, and is harder and firmer than the original. It constitutes the *scar*.

Scar tissue in muscles is not elastic to any extent. In broken bones the union is made first by fibrous tissue, which is afterward filled in with bone cells. This filling is at first excessive, and forms a ring or knob at the broken place, called the *callus* (Fig. 56). After some time the callus reabsorbs, leaving the bone nearly normal in size.

SURGICAL DRESSINGS

The auxiliary nurse usually begins her work with wounds by helping with the simpler things required in

doing the dressings. After practice and observation she learns the proper technic, becomes familiar with the appearance of wounds, and is able to recognize to an extent whether the healing process is going on, and may then be permitted to do simple dressings by herself.

Important dressings of large or complicated wounds usually require two persons, and may need three. When one goes rapidly from one dressing to another, as is usual in a military ward, at least three persons are needed in order to have the work go on quickly and smoothly.

One nurse, usually an auxiliary, goes ahead, places mackintoshes under and around the part to be dressed, removes the bandages (many patients do this for themselves), seeing that the dressing is not disturbed, and arranges the waste-pails or basins. Sometimes she is also made responsible for providing fresh bandages—especially the hip, shoulder, abdominal or scultetus—which will be needed in rebandaging. See that the patient is near enough to the edge of the bed to be reached, and that he is comfortable and properly covered. Turn the bedding back neatly from the part, and arrange it so that it shall not become wet or soiled. If a bandage is clean enough to be used again, have the patient or his neighbor smooth and roll it. (A special bag, pail, or basket is provided for bandages which are to be washed.) Safety-pins should be saved for further use; if badly soiled they may be boiled. External dressings which are not soiled may be used again, or they may be dried and resterilized. Waste cotton is often saved for munition making.

During the dressing an auxiliary may be asked to hold a leg or an arm in position, to resterilize instruments, to hand articles from the dressing carriage, to open packages of sterile materials, etc., or she may be getting the next patient ready.

When a dressing is finished the auxiliary may do the bandaging and tidy the patient's bed.

Do not talk while helping with dressings.

If asked to remove a dressing, grasp it by the cleanest

portion and turn it over, so that any discharge upon it may be seen. Inner dressings are, as a rule, removed with forceps.

Fig. 57.—Doing a dressing in a military hospital.

To open a package of sterile dressings, grasp the wrapping an inch or two back from the edge, so that you shall not touch the contents with your fingers.

Do not put the fingers upon the edge of a solution basin nor even of a waste-basin; put the hands entirely underneath (Fig. 58).

If asked to pour something from a bottle into a wound or on a dressing, wipe the mouth of the bottle before pouring. If the cover of a jar or the stopper of a bottle must be laid

Fig. 58.—The right way to handle a solution basin.

down, turn it with the inside up and see that it does not touch anything.

When handing the tubing of an irrigator, take hold of it at least 6 inches from the end, so that the doctor or other nurse need not put their hands where yours have been.

All materials used in doing surgical dressings must be sterilized and kept so. The dressing carriage is a portable table, more or less elaborate in its appointments, containing everything needed for doing dressings (Fig. 59). It is stocked with solutions, alcohol, iodin, green soap, etc.;

with sponges, dressings, drainage-tubes, instruments, adhesive plaster, protective dressings, bandages, etc.

Instruments are kept in a sterile pan or towel, and are

Fig. 59.—Dressing carriage with irrigator and solution bowl (Aikens' "Hospital Management").

passed with sterile forceps to the surgeon or nurse who is doing the dressing. (If the forceps become unsterile at any time, by accidentally touching something which is

not sterile, resterilize it by reboiling or by holding it for a moment in an alcohol or gas flame.)

To sterilize instruments boil them for from three to five minutes in a 1 per cent. solution of sal soda; the soda acts as a disinfectant and also prevents them rusting. Knives are not boiled unless by special request; if they are boiled, the blades should be wrapped in cotton and the edges should not be allowed to strike against other instruments. Scissors should be boiled as rarely and as short a time as possible, as the heat takes off the edge.

Dressings Done by a Nurse.—If the nurse herself is to do a dressing she should make the same preparation that she would for the surgeon and follow his methods. A second nurse may be needed to assist, or she may be able to arrange her materials so as to get along alone. Helping an older nurse with a dressing is an excellent way for the auxiliary to learn to assist a surgeon.

Before beginning a dressing the hands should be thoroughly cleaned. Put up the sleeves, use a soft, sterile brush, plenty of soap, and hot, running water if it is to be had. Keep the nails short and clean. Scrub the hands systematically, beginning with the thumb. Consider that each finger has four sides and do not forget the spaces between the fingers. Pay special attention to the nails. Include the wrists. After the scrubbing soak the hands for a minute in a disinfecting solution. For very dirty dressings, or those where there is much discharge, it is well to wear rubber gloves.

In doing a dressing copy the surgeon so far as is possible. Try to be deft. Cultivate a light touch, and endeavor to cause as little pain as is consistent with good work; do not, however, let sympathy for the patient prevent you from being thorough. Watch a skilful surgeon, and note how he cleans a wound well but with a light touch; a clumsy person with good intentions may hurt the patient badly and still not get a good result.

In dressings and in all procedures with surgically clean hands remember to *keep the hands clean*. This requires

much practice and concentration of the attention. Before you begin get well in mind just what things you may touch and studiously avoid all others. Do not permit yourself to make "breaks" in technic. If a sterile article touches anything unsterile reboil or discard it.

In modern military nursing it is the custom to handle everything with sterile forceps. This method is quicker, leaves fewer chances for breaks in technic, and protects the hands from possible contact with pus, and, therefore, from danger of carrying infection to other patients.

Fresh forceps are used for each case.

Care of Instruments.—In cleaning up after dressings the instruments should be washed in soapy water (or if there is blood on them, in clear water, cold); take each one apart and scrub the joints and rough places so as to remove any accumulation of material. Boil them for five minutes in soda solution, being sure that scissors are not boiled a moment too long. Rub them well with some polishing powder that does not scratch, rinse them in very hot water, and dry them thoroughly. In damp climates the joints should be treated with vaselin to prevent rusting.

Do not scour the cutting edge of knives and scissors.

Preparation for Operation.—Patients who are to be operated upon usually have a cathartic given them the night before. They omit the last meal before the operation, so that the stomach shall be empty; food in the stomach at the time of taking an anesthetic may produce vomiting during the anesthesia. Water may be given until two hours before the operation and it is advisable.

The patient should have on a clean shirt and warm, long stockings. He should have urinated recently. If he is to go on a stretcher, he should be warmly wrapped. If he walks to the operating room, he should have a warm robe, and blankets should be sent with him for his return. His chart is sent with him.

A *local preparation* may be ordered—*i. e.*, the locality to be operated upon is shaved, scrubbed well with soap, and painted with iodin. Usually a sterile dressing is put on.

In the majority of war wounds there is no local preparation, since the dressing covers the part to be operated upon.

Care After Operation.—When a patient returns from the operating room he is put into a warmed bed and well covered. Even in summer there should be considerable cover until he has reacted well from the depression caused by the anesthetic. There should be no pillow until the nausea has worn off.

An unconscious patient should not be left alone even for a minute. He may fall out of bed or may injure himself by striking the bed; may vomit and get matter into the trachea; may disarrange the covers and become chilled; or may suddenly collapse.

The nurse should remain at the bedside, see that he is kept covered and lies quietly. If vomiting occurs, turn his head to one side and hold the basin for him.

Guard the hot-water bags which have warmed the bed. As a rule they should be removed, but if left, put them outside the covers; it is very easy for an unconscious patient to be burned.

What to Watch.—The pulse is the important thing to be watched, and any weakness or irregularity in it should be at once reported. Note the color of the face and report any special pallor or blueness. Watch the respiration, noting if it is shallow, sighing, or irregular.

After water is allowed, remember to give it frequently and in small quantities. A large amount given at one time is likely to produce or aggravate nausea, whereas small amounts do not.

Do not report pain until you are sure that the patient is entirely out from the anesthetic.

There is some danger from *hemorrhage* after operation, and the nurse should know its symptoms and be on the watch for it. Paleness of the face and lips, weak pulse, faintness, "air hunger," and sighing respiration may indicate internal hemorrhage.

Treatment of Burns.—*Ambrine* and similar substances are used in treating burns, and have revolutionized former

methods. The specified technic for their application must be followed exactly if success is to be attained.

The Ambrine technic includes the following points:

Raw surfaces are cleansed by gentle irrigation or by dragging over them the ends of a bit of wet cotton. Sponging in the ordinary sense of the word should never be done.

Granulations should not be pressed upon nor made to bleed.

The surface to which ambrine is to be applied must be *absolutely dry*. The drying must be done gently, preferably by a current of warm air.

The melted ambrine is painted or sprayed quickly upon the raw surface, using it as hot as the patient can bear it. A thin film of cotton is laid over, and another coat of ambrine applied. The whole is covered quickly with a thick pad of cotton and bandaged in place.

The ambrine dressing is peeled off and renewed daily.

Sloughs or dead skin are to be removed only when they come off easily.

CHAPTER XIII

INJURIES TO BONES. APPARATUS

Sprains.—When a joint is wrenched or twisted, with resulting injury, it is called a *sprain*. There may be actual tearing of some of the ligaments which bind the bones together and even some displacement of the bones. There is always bruising, swelling, and acute pain.

The immediate treatment of a sprain is the application of cold followed presently by heat. Fomentations are often used to reduce the swelling and tenderness. Sprains are usually put up in plaster casts. Snug bandaging and massage are used. They are long in healing.

A **dislocation** is the displacement of a bone at a joint. It occurs most commonly at the shoulder.

Dislocations must be reduced—*i. e.*, the displaced bone put into place—as soon as possible, otherwise there is pain, swelling, and tenderness which prevent healing. The reduction may have to be done under an anesthetic.

There is no after-treatment except to keep the joint reasonably quiet until the surrounding tissues have returned to normal. A bandage may or may not be applied.

FRACTURES

A broken bone is said to be *fractured*.

Fractures are: (1) *simple—i. e.*, broken across without external injury. They may be *transverse* or *oblique*. In an oblique fracture the ends tend to slip past each other, wound the surrounding tissues, and become permanently displaced. In almost all fractures there is some wounding of the surrounding tissues and some internal bleeding.

(2) A *comminuted* fracture is one in which the bone is

more or less crushed and there are small pieces between the two larger ones. The injury to the surrounding tissues is considerable. Often one or more fragments of bone die and decompose, or an abscess may form.

(3) A *complicated* fracture is one in which a large artery, vein, or nerve is torn, or where one of the internal organs, such as the brain, lung, liver, spleen, kidney, or bladder is wounded by a broken end of bone. The damage may be slight or serious.

(4) A *compound* fracture (see Wounds) is one in which the skin and external tissues are torn through. The ends of the bone may protrude outside the wound. These are

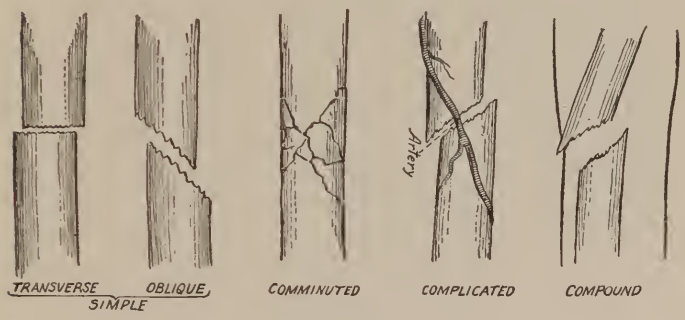


Fig. 60.—Various forms of fracture.

always serious injuries because they are always infected. They are troublesome to care for and long in healing.

(5) An *impacted* fracture is one in which the broken ends of bone—or two bones not broken—are driven into each other. They are rare and difficult to remedy.

(6) A *depressed* fracture is one in which a piece of the skull is broken off and driven in against the brain.

(7) *Greenstick* fracture is one in which the bone is cracked but not broken across. It occurs chiefly in children.

The *x*-Ray in Fractures.—It is customary to examine fractures or suspected fractures with the *x*-ray in order to be sure of the exact state of affairs.

It is usually necessary to secure at least two views of the fracture in order to locate it with accuracy.

Without the *x*-ray fractures must be guessed at, as the pain, swelling, etc., which are always present prevent proper or thorough examination.

Results of Fracture.—All muscles naturally contract; when a bone is broken the muscles which surround it and are attached to it, therefore, tend to pull on the fractured ends and displace them. When the muscles are very large

Fig. 61.—*x*-Ray picture of stellate fracture of the ulna from gunshot wound (Spencer).

and strong, as in the case of the leg or thigh, the pull has so much force that, unless special means are taken to keep the broken ends in place, they will slip past each other and the limb become permanently deformed and shortened.

A bone is **set** by placing the ends which are broken in their proper position, and holding them there by some means until the healing process takes place. This is accomplished by means of splints, plaster casts, sand-bags, extension apparatus, etc.

Splints are made of wood or thin metal.[1] They must be lined or padded so as to be comfortable, as when once adjusted they are left in place for some time. Straight splints are made of small boards covered with cotton—preferably the non-absorbent—bandaged smoothly in place. If they are to be used near wet dressings they should be covered with some water-proof material. Flat metal splints are usually shaped like the part to which they are to be applied. They are lined with several layers of wadding or non-absorbent cotton, smoothly adjusted.

Fig. 62.—Splint applied for fracture of the forearm near the wrist-joint (Scudder's "Fractures").

Splint padding and lining must be changed when it becomes soiled or torn.

Splints must be *very carefully* adjusted, so as to accomplish just the purpose for which they are designed. In bandaging a splint against a limb be sure that it does not get pulled to one side during the process, and that it is firm but not too tight.

Plaster casts are made with bandages impregnated with plaster-of-Paris; they are usually roller bandages of crinoline filled with dry plaster.

For putting on a plaster cast there will be needed several plaster bandages of the proper width (usually 2 inches

[1] Improvised splints may be of any stiff material that is at hand, as pasteboard, small limbs of trees, a sword, rifle, etc. Even a pillow may be used as a splint.

wide for the arm or ankle, 3 inches for a knee or leg, wider for the body), a deep basin of tepid water, a few gauze bandages, and some sheet wadding (white), torn or cut into strips and rolled like a bandage. The bed should be protected with a sheet so placed as to catch all the splashing of the plaster; the floor may be protected with newspapers.

The skin is first covered with some soft material, as a gauze bandage or the wadding; sometimes a stocking or a

Fig. 63.—Applying a plaster cast (Scudder's "Fractures").

piece of knitted underwear is used as a foundation. These absorb perspiration and prevent pressure and discomfort from wrinkles. The plaster bandages are put to soak, one at a time, in the basin of water; they should be stood on end and left in only until the bubbles stop coming from them; the water must be deep enough to entirely cover them. As one bandage is handed to the surgeon, put in another, but do not soak more than are needed, as they will be wasted.

Plaster casts are always put on by a surgeon, as they require skill, exactness, and a knowledge of the condition to be remedied (Fig. 63).

Granulated sugar or coarse salt will remove plaster which has gotten on the hands or skin. The sheet which protects the bed should be rinsed out quickly so that the plaster will not set on it. Any spots on the floor should be quickly wiped off.

A fresh cast is left exposed to the air so that it may dry out. It "sets" in a short time and becomes stiff and hard. When it is thoroughly dry the edges are trimmed if necessary; it is the nurse's business to see that the edges remain smooth and that they do not cut into the flesh or irritate the skin. Any crumbs of dry plaster in the bed are very irritating.

In moving a patient who is wearing a plaster cast remember that the cast is heavy, that the limb is injured, and must be supported and lifted with great care.

Sometimes *starch bandages* are used in place of plaster when a very light, small cast is needed. They are made by passing gauze bandages through boiled laundry starch and are used wet.

For removing a cast, a strong, stiff knife is used, some vinegar, and a medicine-dropper. The surgeon will mark a line where he wishes to cut, and the nurse will follow the line with vinegar trickled from the dropper: this softens the plaster and renders it easy to cut.

Sand-bags are long, narrow sacks filled with sand or earth and covered with rubber sheeting or other waterproof material. They are used to keep a fractured limb in position when for some reason a cast or splint is not desirable. They are usually temporary measures.

They must be kept in the exact position in which the surgeon places them. The patient can be allowed to turn or move but very little.

Extension apparatus is a means of applying weight to a fractured limb so as to exert a continuous pull and overcome the muscle contraction. It is necessary in order to

prevent deformity and shortening of the limb. Many varieties of extension apparatus are in use, some very simple, some elaborate.

Fig. 64.—The Hawley bed, with leg splint and sliding extension.

Whatever form of apparatus is used, its adjustment must be kept exactly as the medical officer places it, and bed-making, bathing, etc., managed so as not to interfere

with it. Do not remove weights without permission, and watch that the patient does not slip down in bed in such a way as to take off the pull: if he complains, notify the medical officer (see Fig. 65).

In cases of compound fracture all apparatus, casts, and appliances are much more complicated. There is a great

Fig. 65.—Forearm extension apparatus. The weights are in the bags at lower part of the frame.

deal of special apparatus employed which can be best understood by seeing it in use (Fig. 66).

Nursing fracture cases requires the greatest possible exactness and skill. The patient must be kept clean and dry, assisted to the comfortable use of bed-pan and urinal, or given enemata, etc., without pulling on the injured part or disarranging splints and apparatus. Bed-sores can only be prevented by beginning the very first day of the

patient's residence in the hospital with measures to relieve pressure and to prevent dampness or irritation.

For changing the bed of a patient with a fractured thigh or hip two nurses are necessary; much care should

Fig. 66.—Blake splint and frame for compound fractures. The leg is weighted for extension—the weights are in the bag hanging at the foot of the bed. It is also weighted for support, so that dressings can be done without disturbing.

be exercised so that not the smallest wrinkle be left in mackintosh or sheets; they should be adjusted and smoothed many times a day.

Patients with fractures of the leg often complain of pain in the heel due to pressure on the bed. It may be relieved by putting a small, firm pad under the ankle so as to leave the heel free.

The pain from fracture, though not severe, is pretty continuous and therefore hard to bear. Being compelled to lie in one position day after day is of itself productive of aching and discomfort. It may be relieved by slight changes in position and by rubbing.

CHAPTER XIV

EMERGENCIES. SPECIAL CASES

It is not the province of this book to deal with occurrences outside a hospital; therefore only *accidents* and *emergencies* likely to be met with in hospital work and needing to be handled by the auxiliary will be mentioned. For other emergencies, see a text-book on First Aid.

General Principles of Action.—When anything goes suddenly wrong with a patient and the condition seems serious, the auxiliary should *send* at once for help, but *should not go.* She owes it to the patient to remain with him; and as a rule immediate help, though unskilfully given, is more effective than skilled help which arrives a little late.

If the nurse is unable to summon help and must go herself, it becomes a matter for judgment as to whether she shall first attempt to control the situation alone or run the risk of what may happen while she is gone. Soldiers are, as a rule, cool-headed enough to do as they are told while one goes for help, and it is rare that some one in the ward is not well enough to help.

The nurse *must* exercise self-control in an emergency. She must learn not to lose her head, but to think before she acts, and not to let the patient become alarmed by any exhibition of anxiety on her part.

HEMORRHAGE

Hemorrhage—*i. e.*, bleeding to a dangerous extent—is one of the more common accidents in hospital practice. It takes experience and judgment to know whether a certain amount of bleeding is dangerous or not. The auxiliary should always give the patient the benefit of a doubt.

Soldiers are less disturbed than civilians by the sight of blood and may lose a serious quantity without much concern.

Signs of hemorrhage are: (1) visible escape of blood in quantity; (2) feeble pulse; (3) pallor of face and lips; (4) faintness or fainting; (5) "air hunger"; a feeling of suffocation; (6) yawning or sighing respiration; (7) thirst; (8) giddiness, dizziness, ringing in the ears, etc.

External hemorrhage is easy to recognize. *Internal* hemorrhage must be judged by symptoms. They are as above stated.

Bleeding may be recognized as *arterial* when it is light red and comes in spurts; as *venous* when it is darker and flows or wells out; as *capillary* when it oozes slowly.

Hemorrhage may be checked:

(1) By **elevating** the part.

(2) By **direct pressure** upon the bleeding point. This may be done with the fingers or by means of a pad and tight bandage.

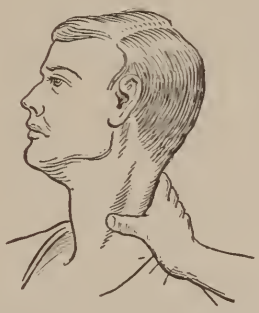


Fig. 67.—Compression of carotid artery with the fingers.

(3) By **pressure upon the artery** which supplies the part. This may be done with the *fingers* (Figs. 67, 68) by *flexing* the limb with a pad in the joint (Figs. 69, 70), or by means of a *tourniquet*—a band around a limb with some means of tightening it; it may be a handkerchief and a stick or a piece of rubber tubing, etc. (Figs. 71, 72).

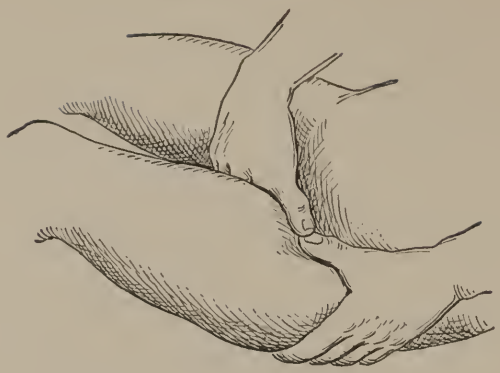


Fig. 68.—Compression of femoral artery.

Fig. 69.—Compression of brachial artery by flexion and pad.

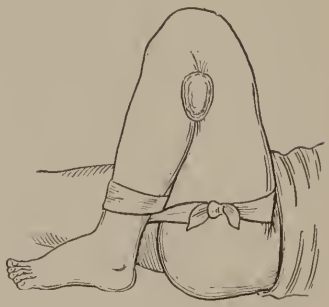


Fig. 70.—Compression of popliteal artery by flexion and pad.

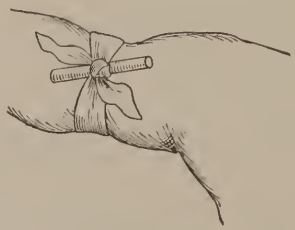


Fig. 71.—Tourniquet on brachial artery.

(4) By the application of *styptic drugs*—rarely used.

Hemorrhage from a wound is usually best controlled by direct pressure upon the bleeding point; a hard roll or pad of sterile gauze should be held tightly against the bleeding

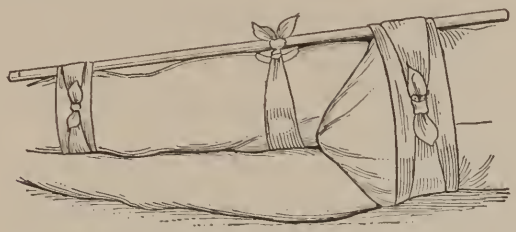


Fig. 72.—Tourniquet applied to femoral artery. Patient's body is turned to show application.

place until the blood has had time to clot. If the bleeding is in a wound of the leg or arm, elevate the part, or flex the limb strongly, or try pressure over the brachial or femoral artery, as the case may be.

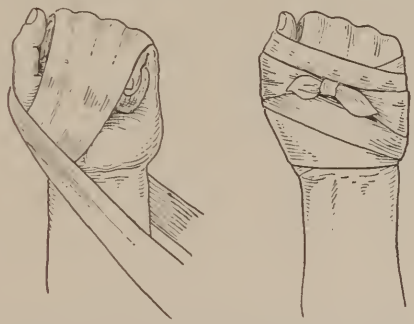


Fig. 73.—Pressure on wound in palm of hand.

If the bleeding is from the stump where an amputation has been done, send for help at once.

Hemorrhage in typhoid or from the **intestines** must usually be recognized by symptoms, though there may be blood passed from the bowel. The symptoms are as for

any internal hemorrhage (see above). Keep the patient lying quietly, put an ice-bag or cold compresses upon the abdomen, and send for the medical officer at once.

Hemorrhage from the lungs may be recognized by the bright color of the blood and by its frothy consistency; it comes up with cough, though it may be slight. Prop the patient into a sitting position and keep him absolutely quiet. Send word to someone in authority.

Hemorrhage from the stomach is always very dark, even brown, the blood is mixed with food or mucus, is clotted, never frothy, and is vomited or regurgitated. Have the patient lie flat and keep very quiet, controlling any desire to retch or vomit.

Hemorrhage from mouth, nose, or throat may be bright in color and is apt to be stringy, having mucus or saliva mixed with it. (It may be confused with hemorrhage from the lungs if the characteristics of each are not in mind.) It is rarely serious. In nasal bleeding have the patient keep the head upright in preference to bowing it over a basin. Apply cold to the outside of the nose and to the back of the neck. Do not allow the patient to blow the nose.

Pulse in Hemorrhage—Remember that the condition of the patient's pulse tells better than anything else of the severity of the hemorrhage.

Stimulation in Hemorrhage—Do not give stimulants to a patient who has recently had a hemorrhage. They increase the heart action and render the bleeding likely to continue or recur.

Collapse is marked by weak, rapid pulse, anxious expression, and marked symptoms of weakness and prostration. It is to be treated by warmth, quiet, rubbing, etc. The foot of the bed may be raised. Stimulation is given upon the order of a doctor.

Convulsions.—Very little can be done except to keep the patient from biting his tongue or injuring himself by falling, etc. The duration of the seizure should be noted by a

timepiece, and its characteristics observed so that the physician may be told of them with exactness.

Epileptic fits may be confused with convulsions. The patient is unconscious, twitching, frothing at the mouth, and may cry out. The attack may be followed by a short period of delirium. No special treatment can be given. The nurse should remain with the patient, keep him from incurring an injury, and note the length of the attack.

Fainting is due to a deficiency of blood in the brain. Nature suggests the treatment by causing the patient to

Fig. 74.—Sylvester's method of performing artificial respiration (expiration).

fall. He should be laid flat with the head low, no pillow, or even with the head hanging over the edge of the bed, the clothing about the neck and chest loosened, the face bathed with cold water, the window opened, etc. Note the length of time that he remains unconscious.

Artificial Respiration.—If a patient from any cause suddenly ceases to breathe, the nurse should send for help and meantime attempt artificial respiration. For an adult Sylvester's method is probably the easiest. Place the

patient flat on his back, remove the pillow, stand at his head, and, grasping his elbows, press them close to his sides (Fig. 74), striving to push in the ribs and expel the air from the chest. Then pull the arms slowly up over the head, permitting the chest to expand to its fullest capacity (Fig. 75). Lower the arms and repeat the pressure upon the chest. Continue, alternately raising and lowering the arms.

Be careful not to make the movements more rapid than a person breathes, 18 to 20 times per minute. Artificial

Fig. 75.—Sylvester's method of performing artificial respiration (inspiration).

respiration is often ineffective because given too rapidly, so that the chest does not have time to expand.

Fire.—If anything catches fire, do not attempt to pick it up or remove it to another place; this is sure to result in badly burned hands. Throw a rug, blanket, or coat over it. Water is not always effective, though it may be tried, likewise salt solution. Blankets or a heavy coat are usually available in a hospital, and smothering out a flame is the quickest mode of extinguishing it.

Burns.—For the immediate treatment of a burn from hot water, steam, or fire, apply sterile vaselin freely.

If the burn is from an acid, apply a strong solution of baking or washing soda.

If the burn is from an alkali or caustic, as lye, caustic soda, etc., use dilute vinegar or any weak acid which is at hand.

For burns by carbolic, either internally or externally, use plenty of alcohol. If this is not at hand, whisky or brandy will do. Denatured alcohol may be used, but not wood alcohol.

Mistakes in Medicine.—If a wrong dose of medicine has been given, report it immediately. If you are not sure that a mistake has occurred it is best to act as though it had. Induce vomiting by some means (unless the drug swallowed was carbolic or a caustic), by giving mustard and water, salt and water, or try running the finger down the patient's throat.

If help does not arrive shortly the nurse is justified in giving the following—for bichlorid, the raw whites of eggs, 1 to 4 grains of the drug; for carbolic, alcohol or whisky.

Small Wounds of the Hands.—The nurse herself should be very careful about *scratches* or *punctured wounds* which she may get in the course of her work. Safety-pins used about a wound are especially dangerous. No matter how slight the injury may appear, institute prompt treatment for it. Many doctors and nurses have lost their lives from the prick of a needle or the scratch of a pin, and one cannot afford to take chances.

Scrub the wound thoroughly and apply a wet dressing of peroxid, alcohol, or almost any strong antiseptic. Keep the place wet for twenty-four hours or longer if necessary. If one has acquired a slight infection, as a pustule on the hand, open it with a sterile needle and apply a wet antiseptic dressing.

EYE, EAR, NOSE, AND THROAT NURSING

THE EYE

All handling of the eye must be deftly and gently done. Clumsy handling causes pain and may result in injury to the delicate tissues. Thoroughness is essential and is not easy to combine with gentleness. It takes a certain amount of practice to become at all expert.

Opening the Eye.—In holding the eye open be careful not to put any pressure upon the eyeball. Pull the skin of the lid up or down, as the case may be, and hold it firmly

Fig. 76.—Examination of upper eyelid.

against the edge of the orbit. Do not let your fingers press into the soft parts (Figs. 76, 77).

To **evert**, or turn out, the lid, place a small pencil or pen-handle under it, grasp the eyelashes and pull the lid gently down and out, rolling it over the rod.

Foreign bodies in the eye, such as cinders, specks of dirt, etc., may sometimes be removed by holding the eye open and wiping them out with a piece of clean soft linen or a fresh handkerchief. If the patient be restrained from rubbing the eye the tears caused by the irritating object may wash it into the inner corner, from which it can gener-

ally be removed. A drop of castor-oil put into the eye

Fig. 77.—Examination of lower eyelid

Fig. 78.—Putting drops in the eye.

soothes an irritation and assists in removing any foreign material which may be causing it.

Putting Drops into the Eye (Fig. 78).—Have the

patient lie or sit with the head thrown back in a good light. The nurse should stand so that her hands will not come between the eye and the light. The patient may face the light and the nurse stand behind him. Open the lids carefully with the thumb and forefinger and hold them firmly. Hold the dropper near the eye, but be careful not to touch the eyeball. Put one or more drops near the outer corner or into the lower lid; the movements of the eye will distribute them over the eyeball. More than 2 drops are unnecessary. *Droppers used for the eye should be sterile.*

Irrigation by Syringe (Fig. 79).—Use by preference a syringe made entirely of rubber, so that if the patient

Fig. 79.—Method of syringing eye.

struggles a hard glass tip may not strike the eyeball. Lay a bit of cotton over the other eye to protect it; also *avoid letting solution run from one eye into the other.* Turn the patient's head slightly outward, hold a piece of cotton at the outer corner to receive the drainage, and place the nozzle of the syringe near the inner corner, letting the fluid flow outward. The solution should be just com-

fortably warm, never hot nor cold. Use enough to remove all discharge; let there be a little force to the stream so that the cleansing may be thorough. After the irrigation, dry the eye outside with a bit of cotton, wiping outward, away from the nose.

Irrigation with fountain bag is similar to that with a syringe. The bag should be hung very low, so as to have little force to the stream. More solution will be used, so that it is well to have the patient's head on a Kelly pad or rubber sheet.

Precautions in Eye Cases.—For ordinary cases the precaution of not letting fluid run from one eye to the other may be sufficient, but in an infection of any gravity the unaffected eye should be tightly sealed; a watch crystal held in place with adhesive or collodion is often used.

In all cases, whether infected or not, *never use anything for one eye that has touched the other.*

Never touch your own eyes while treating an eye case, nor afterward, *until you have thoroughly scrubbed and disinfected your hands.*

THE EAR

In ear troubles the nurse needs especially to know *what not to do.*

Never, without the advice of a doctor, put into the ear any fluid except warm water.

Never put into the ear any instrument except a toothpick or match well covered with cotton. Insert this very carefully and only a short distance.

Do not permit patients with ear trouble to blow the nose vigorously. It may force infection further in or send additional infection up through the Eustachian tube.

Ear Irrigation (Figs. 80 and 80A).—The ear may be washed out with a bulb or fountain syringe when ordered by a doctor. If a fountain bag or irrigator is used it should be hung very low, on a level with the ear, so that the stream shall have little force. A kidney-shaped basin held just under the ear is a convenient receptacle for catching the drainage. The procedure is best managed with the

Fig. 80.—Irrigation of ear with piston syringe.

Fig. 80*a*.—Method of syringing ear with fountain syringe. The lower end of bag should not be above level of auditory canal.

patient in a sitting position. Use clear water, at a temperature of about 110° F. Direct the stream a trifle upward, not directly at the ear-drum.

THE NOSE

In the treatment and handling of the nose also there is need for gentleness. Any procedure, if improperly done, may be the cause of more harm than good.

Caution all patients against blowing the nose with any force. This habit is the cause of some ear troubles.

Nasal Spray.—If the nose is to be sprayed, use the large tip of the atomizer, one which does not go into the nose

Fig. 81.—Nasal douche. Method for syringing nose. The syringe is introduced into upper nostril, the solution escaping from opposite nostril or mouth.

but just to the rim of the nostril. Tip the atomizer so as to direct the spray *back*, not up. As you spray, ask the patient to inhale forcibly so as to help in reaching every part of the nasal cavity.

The Nasal Douche (Fig. 81).—For cleansing the nose a glass douche or soft-rubber nasal syringe is used. If the latter be employed very little force should be given to the stream, as there is danger of forcing matter into the Eustachian tube and setting up an inflammation in the middle ear. The patient, lying in bed, may turn his head a little to one side over a low basin while the nurse injects or pours the solution into the nostril which is uppermost, letting it run out of the lower. The head is then turned to the other side and the douching repeated. The solution used, usually a mild antiseptic, should be blood warm.

THE THROAT

When the medical officer wishes to make a throat examination he usually prefers a reflected light and uses

Fig. 82.—Throat examination, showing the mirror being introduced, and also the relative position of the patient and examiner and the position of the light (Morrow).

a head mirror (Fig. 82). The light should be behind the patient. The nurse may be asked to steady the patient's head.

Throat Treatments.—If the throat is to be sprayed have the patient say "ah" with the mouth open, so as to make the throat round and permit one to see it. Use the long, curved atomizer tip, placing it as far back as possible, but do not rest it on the tongue. Direct the spray first to one side of the throat, then to the other, then toward the center. If necessary use a tongue depressor, so that you may see the throat well, and be sure that you spray to the back of the throat, not merely the mouth and tongue.

Gargling.—Many patients do not know how to gargle properly, and the solution hardly touches even the pillars of the throat. Try having the patient hold the nose while gargling, and see if the liquid will not go a little further back. A spray is usually more effective than a gargle. A hot gargle gives a more pronounced effect than a cold one.

Irrigation of the throat is much used. Fill a fountain bag or irrigating can with at least two quarts of the prescribed solution, usually hot soda, hot saline, or plain hot water. The tip used is ordinarily a straight glass point. Protect the patient's clothing and have him hold his head over a large basin. Direct the stream so that it reaches and cleanses every part of the back of the throat. The patient can usually do this himself after the object of the treatment is explained to him.

Fractures of the Jaw.—These are extremely difficult and important cases. The auxiliary may be allowed to feed them or to do irrigations of the mouth. All procedures should be carried out with great exactness. Extreme gentleness is necessary, but it must be combined with absolute thoroughness. The mouth must be *kept clean*, yet irrigations must be done so as not to cause pain nor to disturb the healing tissues. Due regard must be had to the possibility of choking the patient with the irrigation.

If a jaw case begins to bleed freely the nurse must make pressure upon the carotid artery (it can readily be found by its strong pulsation) and send another patient at once for help. She must not go herself.

These cases require infinite patience and a cheery disposition, as they are long and discouraging.

CHAPTER XV

ANATOMY AND PHYSIOLOGY

In order to be able to care for the human body it is necessary to know its construction and working.

Fig. 83.—Longitudinal section of a long bone (Morrow).

The **bones** constitute the *skeleton* or framework upon which the body is built. There are about 200 bones. Some of them, as those of the head and chest, are chiefly for the *protection* of vital parts, others are chiefly for *support* and the *attachment of the muscles* which move the body.

Bones are composed of two distinct sorts of tissue—the exterior is of *compact* tissue, hard and dense; the interior is of *cancellous* tissue, spongy, containing blood-vessels. In a few bones, as the femur (thigh bone) and the humerus (upper arm bone), the center is a hollow canal filled with *marrow*—fat and blood-vessels (Fig. 83).

Outside the bone and firmly adherent to it is the *peri-*

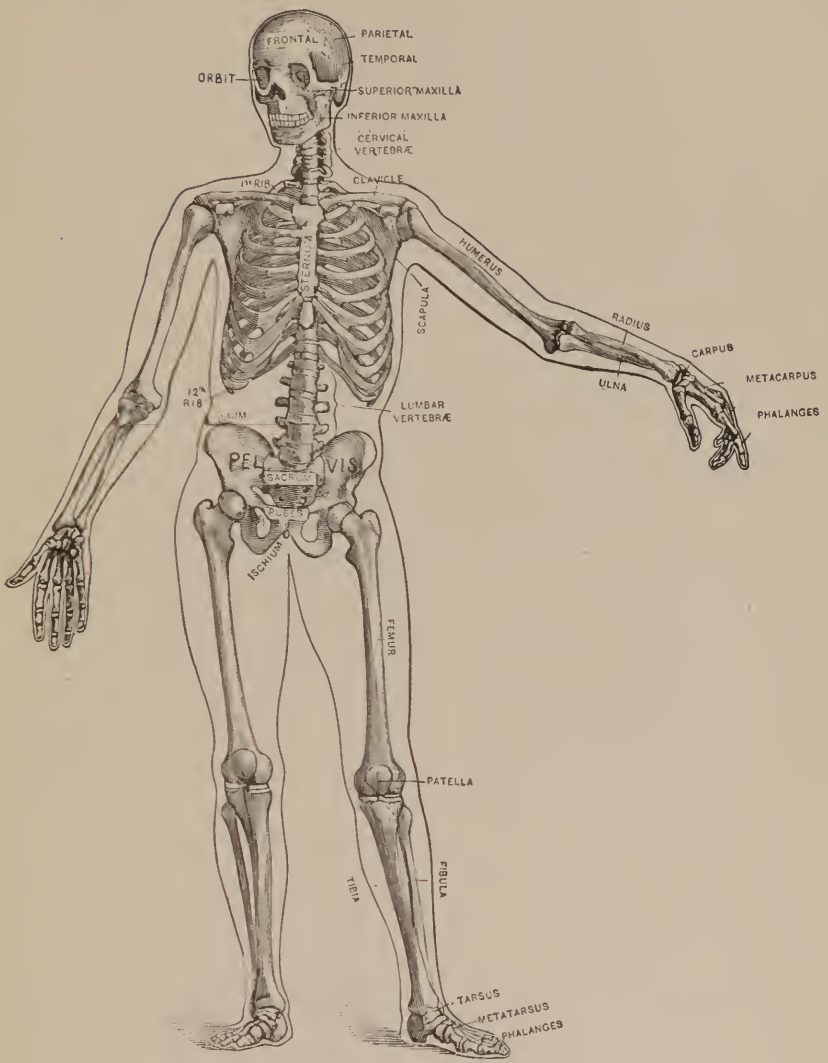


Fig. 84.—The human skeleton.

osteum, a tough, hard, bluish-white membrane containing blood-vessels. It is absolutely essential to the life and growth of bone.

The chief bones of the body are as follows:

The Head (Fig. 85).—Eight *cranial* bones; these are fitted closely together; the joints, called *sutures*, break the force of blows and shorten a fracture which may occur.

Fig. 85.—Side view of the skull (Sobotta).

The spheric shape, better than any other, distributes the force of blows. The thickest part of the skull is the *temporal* bone—around the ear.

There are twelve bones of the *face*. These protect the eyes and nose, afford insertion for the teeth, etc. The lower jaw (*inferior maxilla*) is the only bone of the head that is movable.

The *hyoid* bone, that of the tongue, is not joined to any other bone, but is imbedded in the thick, fleshy root of the tongue.

Fig. 86.—The spinal column (Church and Peterson).

The **spinal column** (Fig. 86) is made up of twenty-four *vertebræ* (singular, *vertebra*), of which seven are *cervical* (of the neck), twelve *dorsal* (of the back), and five *lumbar*

(of the loins or small of back); the *sacrum* (five vertebræ fused together), and the *coccyx* (three rudimentary vertebræ fused). The lumbar vertebræ are the largest and heaviest, the dorsal next in size.

There are three parts to a vertebra (Fig. 87); the *body* or supporting part; the *canal*, through which runs the spinal cord; and the *processes* for the attachment of muscles.

The spine is not straight. It has three principal curves,

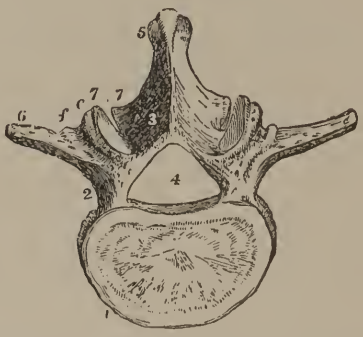


Fig. 87.—A type of vertebra (Leidy): 1, Body; 2, pedicle; 3, lamina; 4, spinal foramen; 5, spinous process; 6, transverse process; 7, articular process.

one out at the shoulders, one in at the center of the back, one out at the lumbar region.

The skull rests on the top of the first cervical vertebra, which has no body, but is merely a ring which permits free movement.

There are twenty-four **ribs** (Fig. 88), twelve on each side. They are all attached to the spine at the back. The upper seven pairs are joined in front directly to the *sternum* (breast bone); the next three pairs are connected by long cartilages to the ribs above them, and so indirectly to the breast bone; the two lower pairs are "floating"—*i. e.*, attached only to the spine.

The **sternum** is a flat bone consisting of three parts,

the lower being of cartilage or gristle (the ensiform cartilage).

The **clavicle** (collar bone) and the **scapula** (shoulder-blade) are considered as belonging to the arm, since they are essential to its movements.

The **clavicle** is joined to the sternum at its inner end and to a process (pointed end) of the scapula at the shoulder or outer end. It is a round bone, shaped like

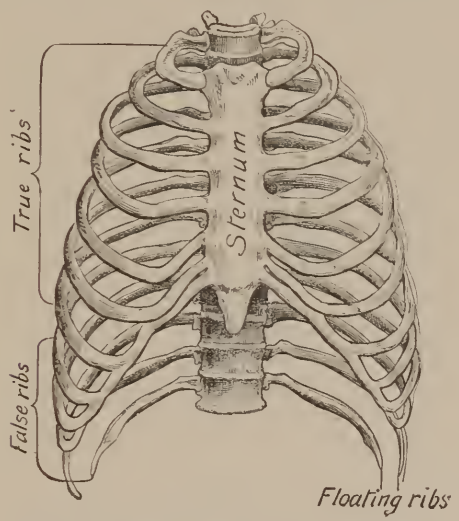


Fig. 88.—Thorax (anterior view) (Ingals).

an italic *f* (*f*), which gives it spring and elasticity to resist blows.

The **scapula** is a flat, triangular bone with a high ridge or "spine" running across it. It protects the ribs underneath. It is attached to other bones only at the shoulder, where its two processes or points form a sort of cavity into which the head of the *humerus* (arm bone) fits. The scapula is very movable, and for this reason is rarely broken.

The **humerus** has a *head*, a short *neck*, and a *shaft*. The

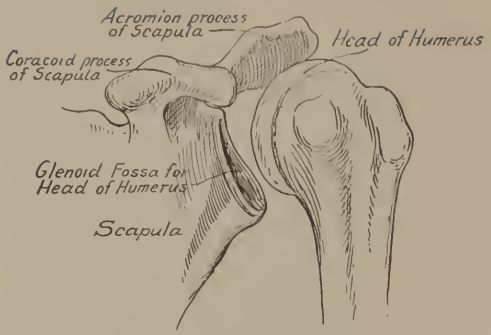


Fig. 89.—The shoulder-joint.

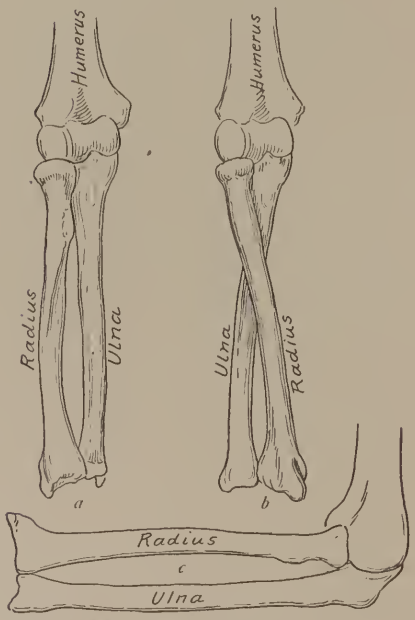


Fig. 90.—Movements of the ulna and radius.

head is rounded and fits into the cavity formed by the processes of the scapula, making a *ball-and-socket* joint

which is very movable. (In shoulder dislocations this head slips out of the socket.) The shaft is somewhat triangular in shape. The lower end of the humerus is large and rough for the elbow *articulation* (joint).

The **ulna** and **radius** are the bones of the forearm.

The *ulna* has a long, curved-on-the-flat process (the olecranon) which forms the point of the elbow. Its shaft is triangular.

The *radius* has a rounded, freely moving head, which actually rolls around the ulna, permitting the free turning of the hand and wrist.

Fig. 91.—Right carpal bones, dorsal surface: S, Scaphoid; L, semilunar; C, cuneiform; P, pisiform; U, unciform; 7, os magnum; 1T, trapezoid; T, trapezium (Leidy).

The *carpus* (wrist) contains eight small bones, irregular in shape, arranged in two rows (Fig. 91).

The **metacarpal bones,** those of the palm of the hand, are five.

The **phalanges**[1] (finger bones) number fourteen, three in each finger, two in the thumb. Their ends form the knuckles.

The two **innominata** (hip bones) are large and very irregular. Each has three parts—the *ilium*, the broad, flat

[1] Singular, *phalanx*.

wing which forms the hip prominence; the *ischium*, the lower portion, upon which one sits; and the *pubes* or front portion. The two pubic bones join, having a pad of cartilage between them. The ilia or wings fit on to each side of the sacrum at the back, the *sacro-iliac* joint. At the junction of the three parts is a cavity called the *acetabulum*,

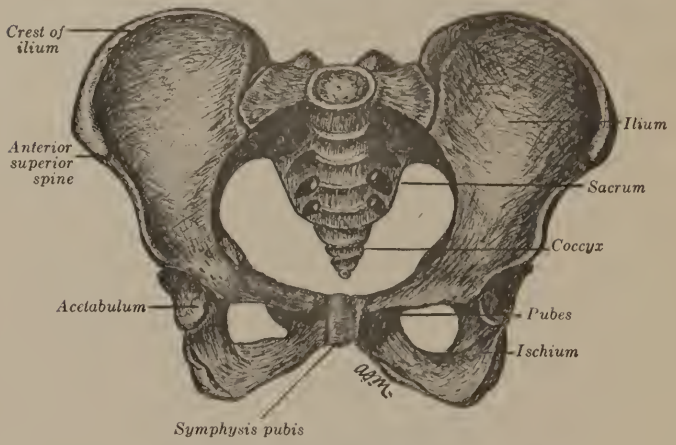


Fig. 92.—The pelvis (Morrow).

into which the head of the femur fits. This is a ball-and-socket joint (Fig. 93).

The **femur,** or thigh bone (Fig. 93) has a *head*, a long *neck*, a protuberance called the *great trochanter*, and a *shaft*. At the lower end are two protuberances called *condyles*. It is the largest bone in the body.

The **tibia** and **fibula** are the bones of the leg. The tibia or shin-bone is the larger; its shaft is triangular. The fibula is very slender and serves chiefly as a reinforcement. It does not enter into the knee-joint and only secondarily into the ankle-joint.

The **patella** (knee-cap) is a flattish bone, roughly triangular in shape, placed over the knee-joint to protect it. It is inserted between the layers of a large tendon.

The ankle bones (**tarsus**) are seven. They make up the whole of the back half of the foot. The upper bone, which

Fig. 93.—The femur, or thigh bone (Morrow).

with the tibia and fibula form the ankle-joint, is the *astragalus;* the heel bone is the *os calcis.* These bones, with the five **metatarsals,** form the arch of the foot; the

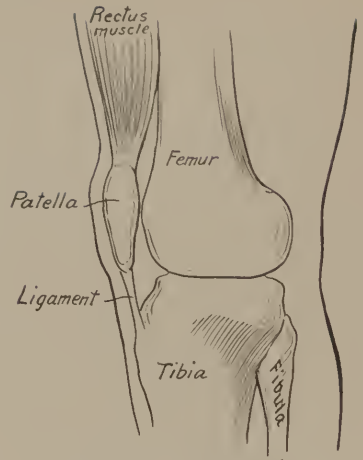


Fig. 94.—The patella.

Fig. 95.—Bones of the right foot, dorsal surface: 1, Astragalus; 3, os calcis; 4, navicular; 5, internal cuneiform; 6, middle cuneiform; 7, external cuneiform; 8, cuboid; 9, metatarsus; 10–14, phalanges (Leidy).

arch form breaks the jar of walking or running, allows free movement, and affords a strong support—better than a flat foot would.

The **phalanges,** or toe bones, are fourteen, and are similar to the finger bones, but shorter and stronger.

There are three great **cavities** in the body—the **cranium,** containing the brain, protected by the bones of the skull; the **thorax** or chest, containing the heart and lungs, protected by the breast bone, collar bones, ribs, shoulder-blades, and part of the vertebræ; and the **abdomen** (of which the lower part is called the *pelvis*), containing the digestive organs, the urinary organs, and the reproductive organs; these are unprotected in front, but the sides and back are guarded by the hip bones, the lumbar vertebræ, and the sacrum.

THE JOINTS

Articulations or joints are *movable* or *immovable.* Hip-shoulder-, knee-, and elbow-joints are examples of movable ones; those of the skull and pelvis are immovable.

The hip- and shoulder-joints are *ball-and-socket* joints;

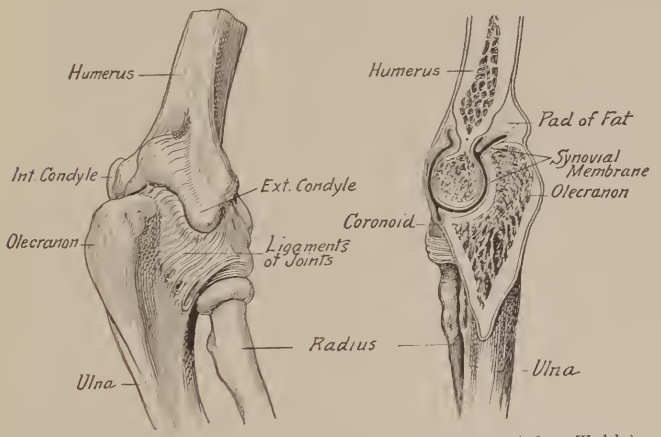


Fig. 96.—The elbow joint, exterior and in section (after Toldt).

the knee, elbow, etc., are *hinge* joints; the wrist, ankle, etc., are *gliding* joints.

The part of a bone which meets another, forming a movable joint, is covered with a layer of cartilage (gristle) called *articular cartilage*. This affords a smooth surface for motion, breaks the jar or shock of movements and the pressure of the weight of the body. The joint is lined with a thin, fine membrane, the *synovial membrane*, that secretes a small amount of fluid which lubricates the joint.

The bones forming a joint are bound together by **ligaments**, strong fibrous bands, firmly adherent, which

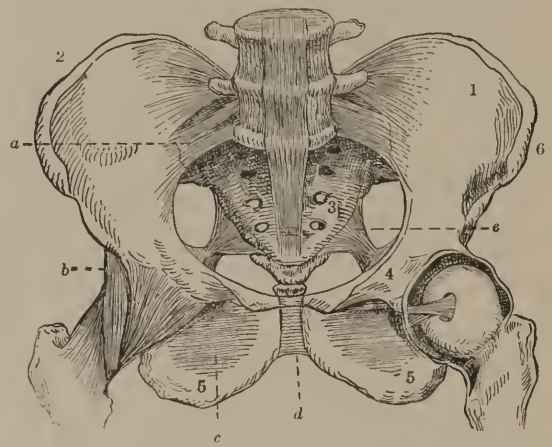


Fig. 97.—Front view of the pelvis, with its ligaments: 1, Innominate bone; 2, crest of ilium; 3, sacrum; 4, pubes; 5, tuberosity of ischium; 6, anterior superior spine of ilium; *a*, anterior sacro-iliac ligament; *b*, iliofemoral ligament; *c*, obturator membrane; *d*, symphysis pubis; *e*, sacrosciatic ligament (Dorland).

stretch only enough to permit the required movement. The ligaments of the pelvis and head of the femur are good examples of the construction of the body (Fig. 97).

One can readily see that a wound or injury which includes a joint is a serious matter, since so many tissues are involved. Permanent stiffness is an almost certain consequence.

THE MUSCLES

Muscles constitute the fleshy portion of the body. They are made up of *fibers* which have the power of *contraction*.

Muscles are *voluntary* or *involuntary*—*i. e.*, controllable by the will or not. The involuntary are mostly those belonging to the vital organs; they are somewhat different in structure from the voluntary, external muscles.

Attachment of Muscles.—In most cases each end of a muscle is attached to a bone.[1] The attachment is made by means of **tendons**, firm bands or heavy cords, slightly elastic, often quite long. (The Achilles tendon, at the back of the heel, is the largest tendon in the body.) Tendons are usually enclosed in *sheaths*, through which they run freely; if a tendon sheath is injured or involved in scar tissue it interferes with the tendon's power of movement.

The end of a muscle which is the more fixed and from which it acts is called its *origin;* the end at which the movement is carried out is called the *insertion*. For example, the biceps of the upper arm has its two origins on the humerus and on the scapula, its insertion on the ulna. The *belly* of a muscle is its middle or largest portion, where the contraction which produces a movement is most visible.

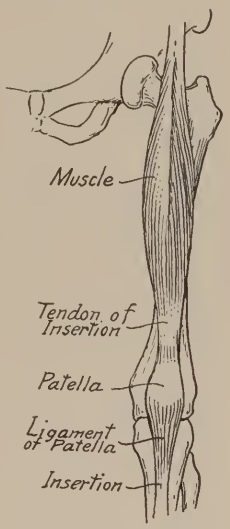


Fig. 98. — Attachment of tendons to muscle.

Movements.—Nearly all muscular movements are complicated—*i. e.*, involve not one but several muscles. The simplest movements are *extension*, straightening, and

[1] The muscles of the face are attached to bone at one end only, the outer end being inserted in the skin. By this means facial expression is produced.

flexion, bending. (Clenching the hand is an example of flexion; straightening the arm, of extension.)

Fig. 99.—Muscles of the right side of the head and neck: 1, Frontalis; 2, temporal; 3, retrahens aurem; 4, orbicularis palpebrarum; 5, pyramidalis nasi; 6, compressor naris; 7, levator labii superioris alæque nasi; 8, levator labii superioris; 9, zygomaticus major; 10, orbicularis oris; 11, depressor labii inferioris; 12, depressor anguli oris; 13, anterior belly of digastric; 14, mylohyoid; 15, hyoglossus; 16, stylohyoid; 17, posterior belly of digastric; 18, the masseter; 19, sternohyoid; 20, anterior belly of omohyoid; 21, thyrohyoid; 22, 23, lower and middle constrictors of pharynx; 24, sternomastoid; 25, 26, splenius; 27, levator scapulæ; 28, anterior scalenus; 29, posterior belly of omohyoid; 30, middle and posterior scalenus; 31, trapezius.

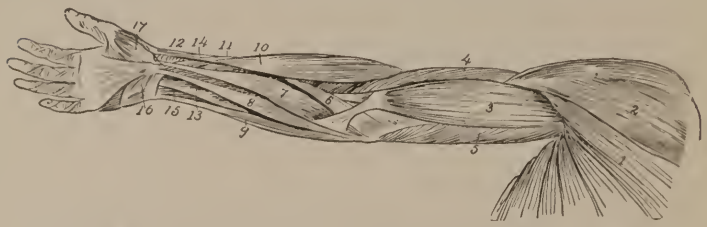


Fig. 100.—Superficial muscles of shoulder and arm (from before): 1, Pectoralis major; 2, deltoid; 3, biceps brachii; 4, brachialis anticus; 5, triceps; 6, pronator radii teres; 7, flexor carpi radialis; 8, palmaris longus; 9, flexor carpi ulnaris; 10, supinator longus; 11, extensor ossis metacarpi pollicis; 12, extensor brevis pollicis; 13, flexor sublimis digitorum; 14, flexor longus pollicis; 15, flexor profundus digitorum; 16, palmaris brevis; 17, abductor pollicis.

The Principal Muscles.—There are about 500 muscles in the human body.

Some of the more important muscles are:

The *masseter*, at the outside of the jaw.

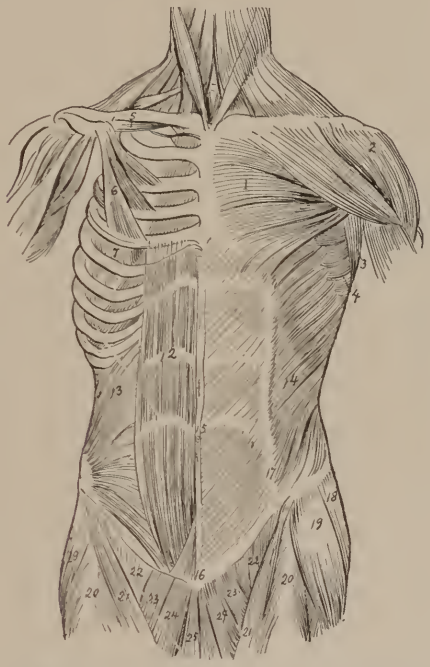


Fig. 101.—Muscles of the trunk from in front (left side, superficial; right side, deep): 1, Pectoralis major; 2, deltoid; 3, portion of latissimus dorsi; 4, serratus magnus; 5, subclavius; 6, the pectoralis, sternocostal portion; 7, serratus magnus; 12, rectus abdominis; 13, internal oblique; 14, external oblique; 15, abdominal aponeurosis and tendinous intersections of rectus abdominis; 16, over symphysis pubis; 17, linea semilunaris; 18, gluteus medius; 19, tensor vaginæ femoris; 20, rectus femoris; 21, sartorius; 22, femoral part of iliopsoas; 23, pectineus; 24, adductor longus; 25, gracilis.

Sternomastoid, at the side of the neck.

Deltoid, over the top of the shoulder.

Biceps, the front of the upper arm.
Triceps, the back of the upper arm.

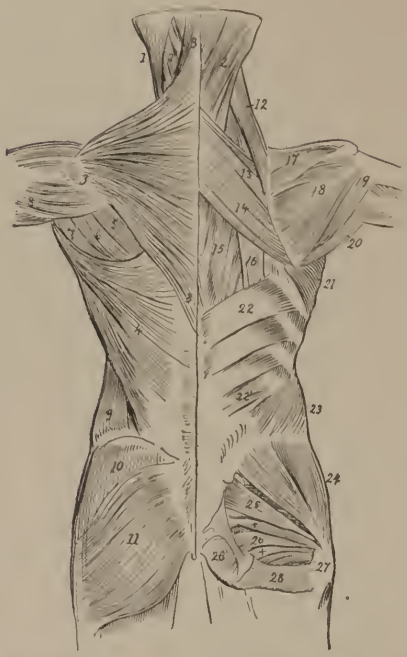


Fig. 102.—Muscles of the trunk from behind (left side, superficial; right side, deep): 1, Sternomastoid; 2, splenius; 3, trapezius; 4, latissimus dorsi; 5, infraspinatus; 6, teres minor; 7, teres major; 8, deltoid; 9, external oblique of abdomen; 10, gluteus medius; 11, gluteus maximus; 12, levator anguli scapulæ; 13, rhomboideus minor; 14, rhomboideus major; 15, part of longissimus dorsi; 16, tendons of insertion of iliocostalis; 17, supraspinatus; 18, infraspinatus; 19, teres minor; 20, teres major; 21, serratus magnus; 22, upper, and 22′, lower part of serratus posticus inferior; 23, internal oblique; 24, gluteus medius; 25, pyriformis and superior and inferior gemelli; 26, 26′, portions of obturator internus; 27, tendon of obturator internus; 28, quadratus femoris.

Extensors and *flexors* of the fingers, the forearm.
Pectorals, the front of the chest.

Gluteals, the buttock.
Quadriceps maximus, the thigh.
Soleus, calf of the leg.

Fig. 103.

Fig. 104.

Fig. 105.

Fig. 103.—Muscles of the inner side of thigh and interior of pelvis: 1, Iliacus; 2, psoas magnus; 3, obturator internus; 4, pyriformis; 5, erector spinæ; 6, gluteus maximus; 7, sartorius; 8, adductor longus; 9, gracilis; 10, adductor magnus; 11, semimembranosus; 12, semitendinosus; 13, rectus femoris; 14, vastus internus.

Fig. 104.—Superficial muscles of the leg from inner side: 1, Vastus internus; 2, sartorius; 3, gracilis; 4, semitendinosus; 5, semimembranosus; 6, inner head of gastrocnemius; 7, soleus; 8, tendon of plantaris; 9, tendon of tibialis posticus; 10, flexor longus digitorum; 11, flexor longus hallucis; 12, tibialis anticus; 13, abductor hallucis.

Fig. 105.—Superficial muscles of front of thigh: 1, Insertion of external oblique into iliac crest; 2, aponeurosis of external oblique; 3, external abdominal ring; 4, gluteus medius; 5, tensor vaginæ femoris; 6, sartorius; 7, iliopsoas; 8, pectineus; 9, adductor longus; 10, gracilis; 11, adductor magnus; 12, vastus externus; 13, rectus femoris; 14, vastus internus; 15, biceps flexor cruris.

The *back* has five layers of muscle, thin, running up and down and diagonally.

The *abdomen* has four layers—vertical, horizontal, and diagonal.

Sphincter muscles are those which control an opening, as of the bowel (anus) or the bladder (urethra).

Fig. 106.

Fig. 107.

Fig. 106.—Muscles of leg and foot (from before): 1, Tendon of rectus femoris; 2, vastus internus; 3, vastus externus; 4, sartorius; 5, iliotibial band; 6, inner head of gastrocnemius; 7, inner part of soleus; 8, tibialis anticus; 9, extensor proprius hallucis; 10, extensor longus digitorum; 11, peroneus longus; 12, peroneus brevis; 13, peroneus tertius; 14, origin of extensor brevis digitorum.

Fig. 107.—Superficial muscles of leg (from behind): 1, Vastus externus; 2, biceps flexor cruris; 3, semitendinosus; 4, seminembranosus; 5, gracilis; 6, sartorius; 7, outer, and 8, inner, head of gastrocnemius; 9, plantaris; 10, soleus; 11, peroneus longus; 12, peroneus brevis; 13, flexor longus digitorum; 14, tibialis posticus; 15, lower fibers of flexor longus hallucis.

Of the **involuntary** muscles, the most important are the *diaphragm* (the partition between chest and abdominal

cavities), the *stomach* muscle, and those of the walls of the *intestines*.

The **heart** muscle is both voluntary and involuntary. It is affected by the emotions, which are to an extent under the control of the will.

Paralysis means loss of power to the muscles, either the voluntary or involuntary.

CHAPTER XVI

ANATOMY AND PHYSIOLOGY (Continued)

THE CIRCULATORY SYSTEM

The **circulation** of the blood is carried on by the heart and blood-vessels. The blood-vessels are the *arteries*, which carry blood *from* the heart; the *veins*, which carry it *to* the heart; and the *capillaries*, which connect the two.

The **blood** nourishes the body and builds up the tissues. It also carries off some of the waste products. It obtains its nourishment (1) from the lungs, where it receives

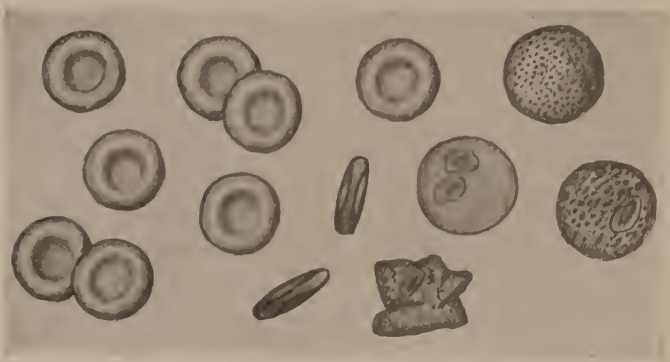


Fig. 108.—Blood cells. Red cells upon the left, white cells upon the right (Morrow).

oxygen, and (2) from the digestive organs, where it gets food materials.

Composition of Blood.—Blood has both fluid and solid constituents The fluid is the *serum*, the pale yellow "water" seen in a blister. The solids are the *fibrin*, a gelatinous substance which thickens upon exposure to the air, and the *corpuscles* or blood-cells (Fig. 108).

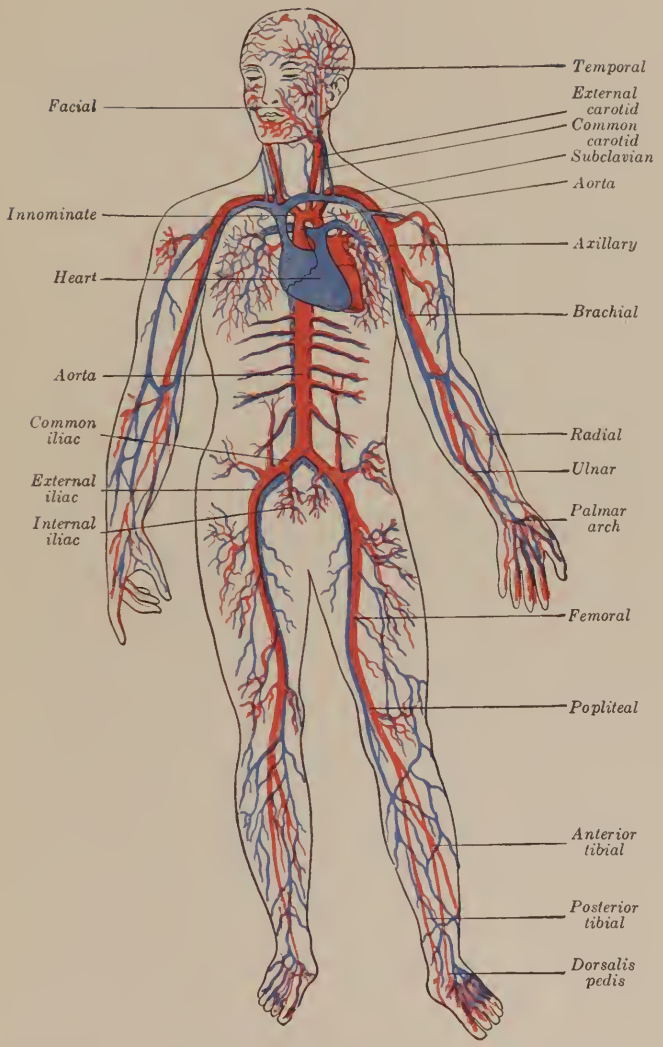


Fig. 109.—The principal arteries and veins of the body (Morrow).

The **corpuscles** are *red* and *white*. The red corpuscles are the smaller and by far the most numerous. The white are few in number and larger; they are the scavengers of the body, literally eating up infections, etc., which may occur.

The *spleen* repairs and regenerates the worn-out corpuscles by methods not well understood. It is a small

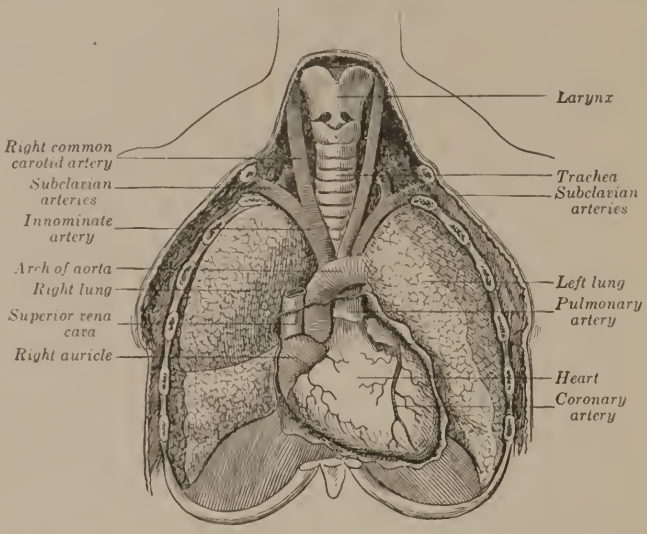


Fig. 110.—Relation of lungs to other thoracic organs (Pyle, "Personal Hygiene").

organ, situated in the left side of the abdomen, next the stomach. It becomes enlarged in typhoid.

When blood escapes from the vessels on account of a wound the corpuscles and fibrin become entangled, forming a *clot*, which, being solid and adhesive, helps to stop the wound and prevent further loss of blood. It also seals the wound against the entrance of dirt or germs. Either cold or a high degree of heat (120° F. or over) assists the *coagulation*.

When the outer layer of skin is removed, as in an excoriation or a burn, the serum exudes and dries, forming a sort of varnish which protects the tissues from foreign matter or infection.

The **heart** is about the size of one's fist. It is situated slightly to the left of the center of the chest, behind the sternum, between and partly covered by the lungs. The

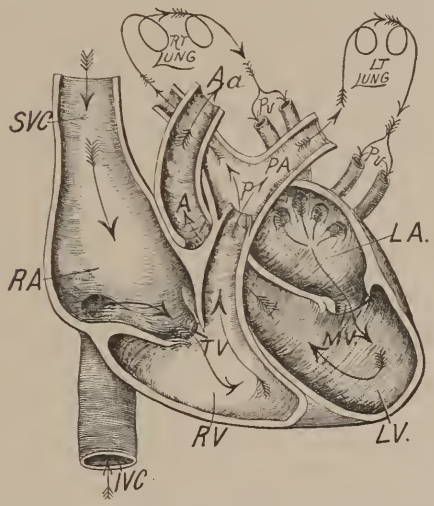


Fig. 111.—Normal blood-currents in the heart and relative position of the ventricles, auricles, and great vessels: *IVC*, Inferior vena cava; *SVC*, superior vena cava; *RA*, right auricle; *TV*, tricuspid valves; *RV*, right ventricle; *P*, pulmonary valves; *PA*, pulmonary artery; *Pv*, pulmonary veins; *LA*, left auricle; *MV*, mitral valves; *LV*, left ventricle; *A*, aortic valves; *Aa*, aortic of aorta (Page).

"apex beat," the one usually felt, occurs just below the point of the heart; the organ is placed higher than is usually supposed.

The heart is enclosed in a fibrous sac, double, called the *pericardium*. Between its two layers is a small amount of fluid which allows the heart to move inside of it without friction.

The heart is a hollow muscle with four chambers, two *auricles* and two *ventricles*. The ventricles have the stronger muscle wall. There are valves between the auricles and ventricles which permit the blood to go through them only one way. The right side of the heart is quite separate from the left side.

The heart *beats*—*i. e.*, its muscle walls contract—70 to 80 times per minute.

The **course** of the blood *through the heart* is as follows (Fig. 111): The right auricle receives the blood, loaded with carbon dioxid and other impurities, from all over the body. When the heart relaxes, between the beats, the valves open, permitting it to flow into the right ventricle. When the heart contracts again these valves, being "one-way," are forced shut and the blood in the ventricle escapes by its only possible route, the pulmonary artery, which carries it to the lungs. There it is distributed, gets rid of its carbon dioxid and some other impurities, and is oxygenated. It is again collected and returns to the heart by way of the pulmonary veins; entering the left auricle it flows during the heart's relaxation through another set of valves into the left ventricle. From here the contraction of the heart sends it out through the *aorta*, whence it is distributed to the body by the arteries.

The **chief arteries** are as follows (see Fig. 109):

The *aorta* (its parts are called the arch, the thoracic, and the abdominal), situated just in front of the spine. It is about the size of the thumb.

The right and left *iliac*, formed by the division of the abdominal aorta, situated deep in the pelvis; they supply the lower limbs.

The *femoral* is a continuation of the iliac, situated along the inside of the thigh, starting in the groin. It is about the size of the little finger.

The *popliteal*, a continuation of the femoral, situated in the space behind the knee.

The *anterior tibial*, situated between the tibia and fibula, is about the size of a quill.

The *dorsal*, on top of the foot.

The *plantar*, in the sole of the foot.

The *common carotid* supplies the head and brain; it is at the side of the neck, along and under the sternomastoid muscle. It is about the size of the finger.

The *subclavians*, right and left, supply the arms; they are deep in behind the collar bone (hence the name).

The *axillary* continues the subclavian into the armpit. It is about the size of a pencil.

The *brachial* continues the axillary along the inside of the arm to the bend of the elbow.

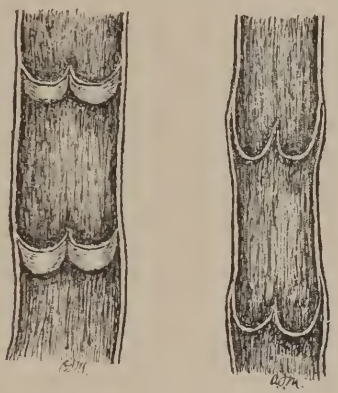


Fig. 112.—Diagram of the valves of veins (Morrow).

The *radial*, one of the two divisions of the brachial, is on the thumb side of the forearm. It is in this artery that the pulse is usually taken.

The *ulnar* lies along the little finger side of the forearm.

The *palmar arch*, deep in the palm of the hand.

The Veins.—The principal veins are placed alongside of or near the arteries and correspond to them in size.

The blood from the veins of portions of the body below the heart is collected into the *inferior vena cava*, that coming from parts above the heart into the *superior vena cava;*

both of the venæ cavæ empty into the right auricle of the heart (see Fig. 111).

In the veins the blood is kept in motion: (1) by pressure from behind; (2) by muscular contraction; (3) by valves—"one-way," which permit the stream to go only forward, *i. e.*, toward the heart, not backward (Fig. 112).

The **capillaries** (vessels as fine as hairs) connect the arteries with the veins. They form a network throughout the body.

Wounded arteries, because the blood in them is being pumped forward with all the force of the heart, constitute a serious danger. The force of the blood-stream prevents the formation of a clot, or if one forms may dislodge it.

Arterial bleeding is recognized by its light red color and by its coming in regular spurts.

Wounds of the larger veins are serious, but not as vital as those of the arteries. Fatal bleeding may, however, occur from veins.

Venous bleeding is dark red in color and the blood flows or wells out.

Note that all of the great arteries and veins are situated deep and in protected places, so that they are not likely to be injured by ordinary occurrences.

The **total amount of blood** in the body is about 12 *pints*. A loss of $1\frac{1}{2}$ pints is serious, $2\frac{1}{2}$ pints fatal. It should be remembered, however, that blood, because of its color, always appears greater in quantity than it is.

THE LYMPHATIC CIRCULATION

In every organ and tissue of the body are the small vessels called **lymphatics.** These vessels convey the clear fluid called **lymph** to the **lymphatic glands;** they are furnished with many valves to promote the circulation.

The *lymphatic glands* occur in groups, chief of which are those in the neck (*cervical*), the armpit (*axillary*), and in the groin (*femoral*). These glands modify the lymph. Other vessels carry it from them to the *thoracic duct*, situ-

ated deep in behind the stomach, from which it is emptied into a large vein and so into the general circulation.

The special lymphatics which belong to the stomach and intestines are called *lacteals*. They absorb and carry off the more solid elements of the food, pouring it into the thoracic duct, whence it empties into the blood.

Fig. 113.—Diagram showing the course of the main trunks of the absorbent system: The lymphatics of lower extremities (D) meet the lacteals of the intestines (LAC) at the receptaculum chyli (R.C.), where the thoracic duct begins. The superficial vessels are shown in the diagram on the right arm and leg (S), and the deeper ones on the left arm (D). The glands are here and there shown in groups. The small right duct opens into the veins on the right side. The thoracic duct opens into the union of the great veins of the left side of the neck (T) (Yeo).

Any *infection* occurring in the body may easily be distributed by means of the *lymphatics*. For example, if the finger is injured and becomes inflamed and septic the lymphatics may carry the infection up the arm; they may themselves become inflamed—shown by red streaks

running up to the armpit. The lymphatic glands may also become inflamed and abscess.

Or the infection may be carried through the whole body by both lymphatics and the blood-vessels, causing general *septicemia* (blood-poisoning).

The lymphatics are thus of great importance in dealing with wounds.

THE RESPIRATORY SYSTEM

The **lungs** are the organs of respiration or breathing. The air enters them by way of the nose (or mouth), larynx, trachea, and bronchial tubes.

The lungs (see Fig. 110) are enclosed in a double sac called the *pleura*, which is lined with a delicate membrane which permits movement without friction. (*Pleurisy* is an inflammation of the pleura.)

Air is composed of one-fifth oxygen, four-fifths nitrogen, a little carbon dioxid, watery vapor, etc. It is taken into the lungs, where its oxygen is exchanged for the carbon dioxid of the blood, which is one of the waste products of the body. This exchange takes place in the air-cells of the lungs, where the blood is separated from the air by only a very thin membrane, through which the gases pass readily.

Breathing is accomplished by the action of the *diaphragm* and the *muscles* of the *chest* wall. The intake of air is termed *inspiration;* its expulsion, *expiration*. *Respiration* occurs eighteen to twenty times a minute.

Two *sorts of breathing* are recognized—*thoracic*, in which the chest expands noticeably, and *abdominal*, in which the abdomen expands. Men and children usually breathe abdominally; women with the chest.

THE DIGESTIVE SYSTEM

The digestive tract, or *alimentary canal*, consists of the esophagus (gullet), the stomach, and intestines (large and small) (Fig. 114).

The **digestive organs** are the teeth, the salivary glands, the stomach, the pancreas, the liver, and the intestines.

Food if solid must be cut and ground by the **teeth** to reduce it to pieces fine enough for the digestive juices to act upon.

The **salivary glands** (Fig. 115), six in number, lie in front of the ear and underneath the lower jaw. The saliva is

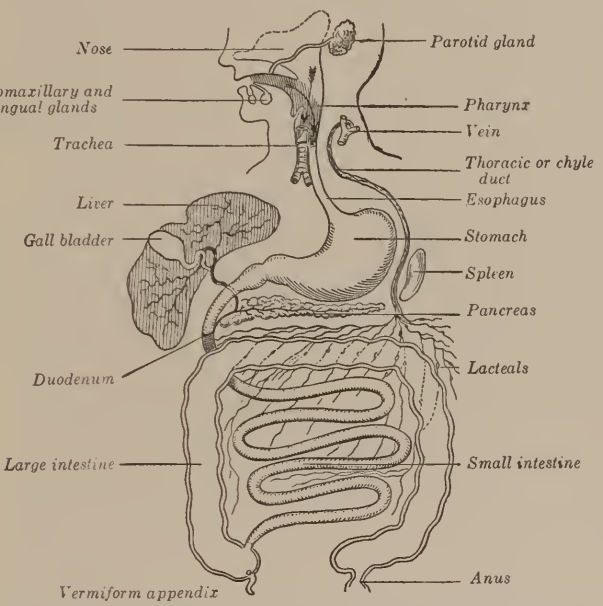


Fig. 114.—General scheme of the digestive tract, with the chief glands opening into it (Raymond).

necessary for the digestion of the starchy elements of food. If not well *insalivated*, food may ferment instead of digesting.

The **stomach** lies at about the waist line, a little to the left of the center of the body. It is a muscular sac, its fibers running in many directions, so that by their contraction the stomach moves and churns its contents thoroughly. The normal capacity of the stomach is about 3 pints.

Food remains in the stomach from one-half hour to four hours, according to its character and the circumstances. By the movements of the stomach and its chemical processes the food is converted into a liquid, called *chyme*, which resembles thick, gray soup. The *gastric juice*, secreted by the stomach for the digestion of animal fibers, etc., is composed of hydrochloric acid and pepsin. Pepsin is a *ferment*[1] which can act only in an acid solution.

The food thus prepared leaves the stomach by way of the *pylorus*, an opening at the right side guarded by a

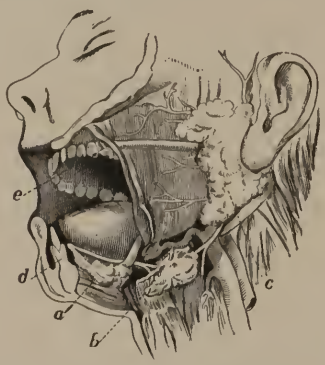


Fig. 115.—The salivary glands: *a*, Sublingual gland; *b*, submaxillary gland, with its duct opening on the floor of the mouth beneath the tongue at *d*; *c*, parotid gland and its duct, which opens on the inner side of the cheek at *e* (after Yeo).

sphincter muscle, and passes into the small intestine. Here it meets (1) the pancreatic juice, (2) the bile, and (3) the intestinal juices, each of which plays its part in the digestive process.

The **pancreas** is a small organ situated behind the stomach. Its duct empties the juice which it secretes into the small intestine just below the pylorus. The

[1] A ferment is a body which excites chemical changes in other materials without itself undergoing change.

pancreatic juice aids in the digestion of starches, animal fibers, and fats; it contains a ferment called *trypsin*.

The **liver** lies on the right side at the waist. It is slightly larger than the stomach. It secretes the *bile*, which is stored in the **gall-bladder,** a small sac on its under surface, until it is required for digestion, when it is emptied into the intestine through the bile-duct. The bile assists in the digestion of fats. The liver has other functions not well understood.

The **small intestine** is about 23 feet long and an inch or more in diameter. It is coiled and gathered to ac-

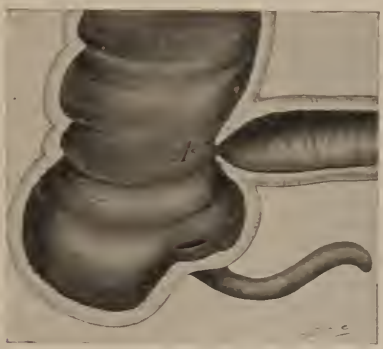


Fig. 116.—The cecum, vermiform appendix, and ileocecal valve: *A*, The ileocecal valve (Campbell).

commodate itself to the other organs. Its juices complete the digestion of food. Its walls and vessels absorb nutriment, some directly into the blood-stream, some into the lymphatics (see page 151), thence—modified—into the blood.

The small intestine ends in the lower right side of the abdomen. Its contents are emptied into the large intestine through a valve-like opening—the *ileocecal valve*—which does not permit them to return. At the beginning of the large intestine is the *appendix vermiformis*, a blind tube about 3 inches long; its use is not known.

The **colon**, or large intestine, is about 6 feet long and 2 inches in diameter. It has no part in digestion, but is merely a reservoir for waste products which the body cannot use. Its parts are called the *ascending*, the *transverse*, and the *descending* colon. The transverse colon lies in front of the stomach and may easily be mistaken for it.

The lower 8 inches of the large intestine is called the *rectum;* its exit, the *anus.*

THE EXCRETORY ORGANS

The chief **excretory organs**—*i. e.*, those which dispose of the waste products of the body—are: (1) the *lungs*, (2)

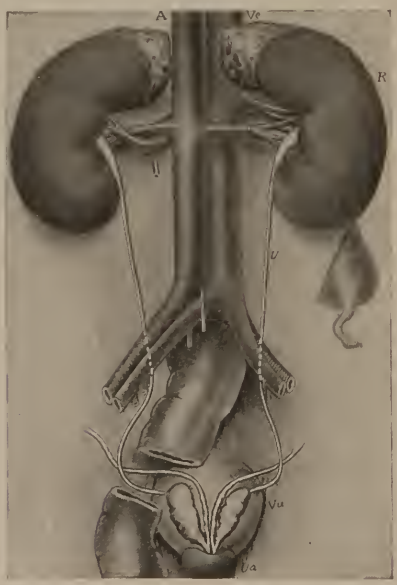


Fig. 117.—The kidneys, ureters, bladder, and their vessels viewed from behind: *R*, Right kidney; *U*, ureter; *A*, aorta; *Ar*, right renal artery; *Ve*, vena cava inferior; *Vr*, right renal vein; *Vu*, bladder; *Ua*, commencement of urethra (Campbell).

the *skin*, (3) the *urinary organs*, and (4) the *intestines.* If

any one of these is clogged or diseased, so that its action is interfered with, the others must carry on the work. If they are unequal to the added labor, an accumulation of harmful, decaying or poisonous matter occurs, very quickly endangering the patient's life. For example, if the lungs are diseased, the skin, digestive organs, and kidneys must be kept active; if the kidneys are diseased, the skin and digestive organs must be well looked after and fresh air provided, and so on. Failure to attend to these things may cause the patient to lose his life.

The **urinary organs** are the kidneys, ureters, bladder, and urethra. The **kidneys** lie in the abdominal cavity, below the muscles of the back, at about the waist line. They separate waste products from the blood, and have, therefore, a large blood-supply. They *excrete* the fluid called *urine*. The urine is carried from the kidneys through fine tubes, about 12 inches long, called the *ureters*, to the *bladder*, which is situated low in the front of the abdomen, behind the pubic bone.

The **bladder** is a hollow reservoir, small and collapsed when empty, elastic enough to contain about $1\frac{1}{2}$ pints when necessary. The urine is discharged from the bladder through the *urethra*, a tube 2 inches long in the female and 5 or 6 inches in the male.

The urinary organs are all very delicate, are easily injured, and are readily attacked by infection.

If for any reason a patient cannot urinate, a *catheterization* must be done. In the case of men patients this is usually done by a doctor; with women, by the nurse. It is carried out like a surgical procedure, with sterile hands and instruments. Any break in technic may cause an infection, resulting in *cystitis* (inflammation of the bladder).

THE NERVOUS SYSTEM

There are two nervous systems, the *cerebrospinal* and the *sympathetic*.

The **cerebrospinal system** consists of the brain and spinal cord and the nerves arising from them (Fig. 118).

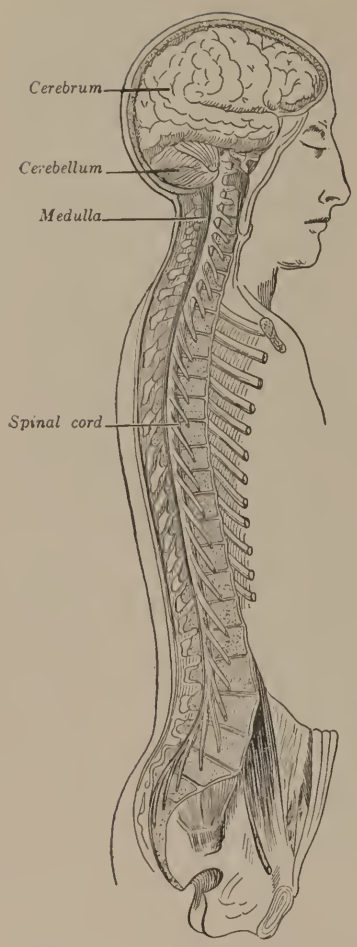


Fig. 118.—General view of the cerebrospinal nervous system (after Bourgery; Schwalbe).

The **brain** is enclosed in the cranial portion of the skull. It consists of gray and white matter, each having its special function. It has a very large blood-supply; part of the blood-vessels of the brain run in *sinuses* or furrows in the skull, like covered ditches; a fracture of the skull or a penetrating wound may break into one of these sinuses and a dangerous or fatal hemorrhage result.

The brain is divided into three parts. The largest is the **cerebrum,** or thinking portion; its surface is undulating, consisting of *convolutions;* it is divided into two *hemispheres*, connected like the halves of a walnut.

The **cerebellum** is at the back of the head, low down; it is the portion of the brain which controls muscular movements.

The **medulla oblongata,** situated at the top of the spinal cord, controls the vital functions.

The **spinal cord** passes from the brain through a large opening in the skull down through the canal made for it in the spine.

Both brain and spinal cord are covered and protected by a thin, fine membrane, double, called the *meninges*. Between its two layers is the meningeal fluid, which still further protects the brain and cord. It is this fluid that is drawn off when a lumbar or *spinal puncture* is done. *Meningitis* is an inflammation of the meninges, usually caused by infection. The infecting bacteria may find

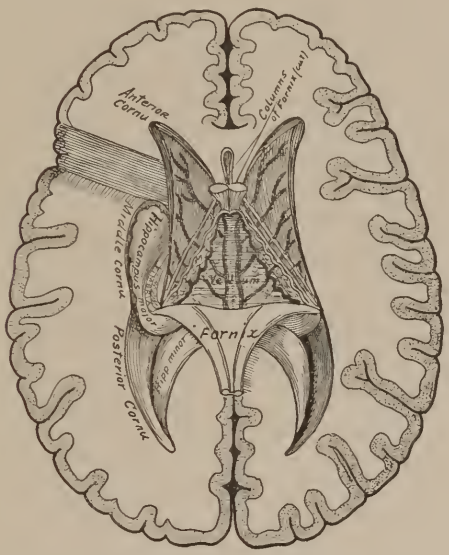


Fig. 119.—Horizontal section of cerebral hemisphere, showing gray and white matter (Spear).

entrance from the nose or throat by way of the Eustachian tube, through the middle ear, thence to the brain, or it may occur through the blood-stream.

Cerebrospinal Nerves.—Both brain and spinal cord send out nerves. There are twelve pairs from the brain, called the **cranial nerves**; they are the nerves of special sense, of sight, hearing, smell, taste, some of the nerves of the face, and one—large and long—called the *pneumogastric*,

which runs to the heart, lungs, stomach, intestines, etc., and plays an important part in their action; it is through this nerve that emotions and mental processes are able to influence health and nutrition.

The **spinal cord** sends out **nerves** throughout its entire length, their exit being through the notches between the vertebræ. These nerves are both *sensory* and *motor*. The sensory fibers carry to the brain the sensations from the surface of the body; the motor fibers transmit motor stimuli from the brain to the muscles.

Nerve-fibers do not branch, like blood-vessels, but are continuous; for example, there is an individual fiber going directly from the tip of the little finger to the brain which does not join into a fiber from any other finger or from any other portion of the body; the communication is direct.

The nerves coming from the brain, either directly or by way of the spinal cord, cross, so that an injury to the right side of the brain will produce paralysis, etc., in the left side of the body, and vice versa.

Paralysis—loss of power, sensation, and motion—occurs from injuries or disease of the brain or spinal cord. The different sorts of paralysis are due to a difference in the location of the injury or to different conditions. Some forms are due to hemorrhage, the blood-clot pressing against the brain substance; some to splintered or displaced fragments of bone; some to the destruction of a portion of the brain or cord tissue; some to laceration of nerve tissue.

The **sympathetic nervous system** consists of two long chains of small *ganglia* connected by *nerves*, situated on each side of the spine, inside the trunk. From these ganglia nerves run to all the organs of the chest and abdomen and to all the involuntary muscles. The ganglia and nerves act whether the person is asleep or awake, and *control the vital functions*, the respiration, the circulation, digestion, etc. The *solar plexus*, situated behind and just below the stomach, is a large group of sympathetic nerves; a severe blow or injury to it causes serious symptoms.

Fig. 120.—Diagram of sympathetic nervous system showing gangliated cord on one side, its connections with the spinal cord and with the various gangliated plexuses, etc. (Spear).

The condition known as **shock** is due to an injury or disturbance of the sympathetic nervous system.

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A Reference Handbook for Nurses. By AMANDA K. BECK, Graduate of the Illinois Training School for Nurses, Chicago, Ill. 32mo of 244 pages. Bound in flexible leather, $1.25 net. **February, 1913**

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This new work is practical in the strictest sense. Written specially for nurses, it confines itself to information that the nurse should know. All unessential matter is excluded. The style is concise and to the point, yet clear and plain. The text is illustrated throughout.

Bacteriology and Pathology for Nurses. By JAY G. ROBERTS, Ph. G., M. D., Oskaloosa, Iowa. 206 pages, illus. $1.50 net. **August, 1916**

DeLee's Obstetrics for Nurses

FOURTH EDITION

Dr. DeLee's book really considers two subjects—obstetrics for nurses and actual obstetric nursing. *Trained Nurse and Hospital Review* says the "book abounds with practical suggestions, and they are given with such clearness that they cannot fail to leave their impress."

Obstetrics for Nurses. By JOSEPH B. DELEE, M. D., Professor of Obstetrics at the Northwestern University Medical School, Chicago. 12mo volume of 508 pages, illustrated. Cloth, $2.50 net. **July, 1913**

Davis' Obstetric & Gynecologic Nursing

JUST OUT—NEW (5th) EDITION

The Trained Nurse and Hospital Review says: "This is one of the most practical and useful books ever presented to the nursing profession." The text is illustrated.

Obstetric and Gynecologic Nursing. By EDWARD P. DAVIS, M. D., Professor of Obstetrics in the Jefferson Medical College, Philadelphia. 480 pages, illustrated. Cloth, $2.00 net. **Published May, 1917**

Macfarlane's Gynecology for Nurses

NEW (2d) EDITION

Dr. A. M. Seabrook, Woman's Hospital of Philadelphia, says: "It is a most admirable little book, covering in a concise but attractive way the subject from the nurse's standpoint."

A Reference Handbook of Gynecology for Nurses. By CATHARINE MACFARLANE, M. D., Gynecologist to the Woman's Hospital of Philadelphia. 32mo of 156 pages, with 70 illustrations. Flexible leather, $1.25 net. Published May, 1913

Asher's Chemistry and Toxicology

Dr. Asher's one aim was to emphasize throughout his book the *application* of chemical and toxicologic knowledge in the study and practice of nursing. He has admirably succeeded.

12mo of 190 pages. By PHILIP ASHER, PH. G., M. D., Dean and Professor of Chemistry, New Orleans College of Pharmacy. Cloth, $1.25 net. Published October, 1914

Aikens' Home Nurse's Handbook NEW (2d) EDITION

The point about this work is this: It tells you, and *shows* you just how to do those little things entirely omitted from other nursing books, or at best only incidentally treated. The chapters on "Home Treatments" and "Every-Day Care of the Baby," stand out as particularly practical.

Home Nurse's Handbook. By CHARLOTTE A. AIKENS, formerly Director of the Sibley Memorial Hospital, Washington, D. C. 12mo of 303 pages, illustrated. Cloth, $1.50 net. Published March, 1917

Eye, Ear, Nose, and Throat Nursing

This book is written from beginning to end *for the nurse*. You get antiseptics, sterilization, nurse's duties, etc. You get anatomy and physiology, common remedies, how to invert the lids, administer drops, solutions, salves, anesthetics, the various diseases and their management. *New (2d) Edition.*

Nursing in Diseases of the Eye, Ear, Nose and Throat. By the Committee on Nurses of the Manhattan Eye, Ear and Throat Hospital. 12mo of 291 pages, illustrated. Cloth, $1.50 net. Published Sept. 1915

Paul's Materia Medica NEW (2d) EDITION

In this work you get definitions—what an alkaloid is, an infusion, a mixture, an ointment, a solution, a tincture, etc. Then a classification of drugs according to their physiologic action, when to administer drugs, how to administer them, and how much to give.

A Text-Book of Materia Medica for Nurses. By GEORGE P. PAUL, M.D. 12mo of 282 pages. Cloth, $1.50 net. Published September, 1911

Paul's Fever Nursing NEW (3d) EDITION

In the first part you get chapters on fever in general, hygiene, diet, methods for *reducing the fever*, complications. In the second part each infection is taken up *in detail*. In the third part you get antitoxins and vaccines, bacteria, warnings of the full dose of drugs, poison antidotes, enemata, etc.

Nursing in the Acute Infectious Fevers. By GEORGE P. PAUL, M. D. 12mo of 275 pages, illustrated. Cloth, $1.00 net. October, 1915

McCombs' Diseases of Children for Nurses

NEW (3d) EDITION

Dr. McCombs' experience in lecturing to nurses has enabled him to emphasize *just those points that nurses most need to know. National Hospital Record* says: "We have needed a good book on children's diseases and this volume admirably fills the want." The nurse's side has been written by head nurses, very valuable being the work of Miss Jennie Manly.

Diseases of Children for Nurses. By ROBERT S. MCCOMBS, M. D., Instructor of Nurses at the Children's Hospital of Philadelphia. 12mo of 509 pages, illustrated. Cloth, $2.00 net. **Published June, 1916**

Wilson's Obstetric Nursing NEW (3d) EDITION

In Dr. Wilson's work the entire subject is covered from the beginning of pregnancy, its course, signs, labor, its actual accomplishment, the puerperium and care of the infant. *American Journal of Obstetrics* says: "Every page empasizes the nurse's relation to the case."

A Reference Handbook of Obstetric Nursing. By W. REYNOLDS WILSON, M. D., Visiting Physician to the Philadelphia Lying-in Charity. 355 pages, illus. Flexible leather, $1.25 net. **April, 1916**

American Pocket Dictionary NEW (9th) EDITION

The *Trained Nurse and Hospital Review* says: "We have had many occasions to refer to this dictionary, and in every instance we have found the desired information."

American Pocket Medical Dictionary. Edited by W. A. NEWMAN DORLAND, A. M., M. D. Flexible leather, gold edges, $1.25 net; indexed, $1.50 net. **April, 1915**

Lewis' Anatomy and Physiology THIRD EDITION

Nurses Journal of Pacific Coast says "it is not in any sense rudimentary, but comprehensive in its treatment of the subjects." The low price makes this book particularly attractive.

Anatomy and Physiology for Nurses. By LEROY LEWIS, M.D. 12mo of 326 pages; 150 illustrations. Cloth, $1.75 net.

Published September, 1913

Pope's Materia Medica

READY SOON

The important knowledge of the physiologic action of drugs is given here. You learn what symptoms to watch for, and the results of each drug upon the various organs and functions of the body. *Vaccines* are included.

12mo of 400 pages. By AMY E. POPE, formerly Instructor in the Presbyterian Hospital School.

Warnshius' Surgical Nursing

READY SOON

The author gives you here the essential principles of surgical nursing, and reliable fundamental knowledge based on his own personal conclusions and experiences. Secondary matter is excluded, and all primary and pertinent points are set down briefly and concisely.

Octavo of 350 pages, with 200 illustrations. By FREDERICK C. WARNSHIUS, M.D., F.A.C.S., Visiting Surgeon, Butterworth Hospital, Great Rapids, Michigan.

Friedenwald and Ruhrah's Dietetics for Nurses

NEW (3d) EDITION

This work has been prepared to meet the needs of the nurse, both in training school and after graduation. *American Journal of Nursing* says it "is exactly the book for which nurses and others have long and vainly sought."

Dietetics for Nurses. By JULIUS FRIEDENWALD, M. D., Professor of Diseases of the Stomach, and JOHN RUHRAH, M.D., Professor of Diseases of Children, College of Physicians and Surgeons, Baltimore. 12mo volume of 431 pages. Cloth, $1.50 net. Published September, 1913

Friedenwald & Ruhrah on Diet

FOURTH EDITION

This work is a fuller treatment of the subject of diet, presented along the same lines as the smaller work. Everything concerning diets, their preparation and use, coloric values, rectal feeding, etc., is here given in the light of the most recent researches.

Published July, 1913

Diet in Health and Disease. By JULIUS FRIEDENWALD, M.D., and JOHN RUHRAH, M.D. Octavo volume of 857 pages. Cloth, $4.00 net

Pyle's Personal Hygiene

NEW (7th) EDITION
Published July, 1917

Dr. Pyle's work discusses the care of the teeth, skin, complexion and hair, bathing, clothing, mouth breathing, catching cold; singing, care of the eyes, school hygiene, body posture, ventilation, heating, water supply, house-cleaning, home gymnastics, first-aid measures, etc.

A Manual of Personal Hygiene. Edited by WALTER L. PYLE, M. D., Wills Eye Hospital, Philadelphia. 12mo, 543 pages of illus.

Galbraith's Personal Hygiene and Physical Training for Women

NEW (2d) EDITION

Dr. Galbraith's book tells you how to train the physical powers to their highest degree of efficiency by means of fresh air, tonic baths, proper food and clothing, gymnastic and outdoor exercise. There are chapters on the skin, hair, development of the form, carriage, dancing, walking, running, swimming, rowing, and other outdoor sports.

Personal Hygiene and Physical Training for Women. By ANNA M. GALBRAITH, M.D., Fellow New York Academy of Medicine. 12mo of 393 pages, illustrated. Cloth, $2.25 net. Published January, 1917

Galbraith's Four Epochs of Woman's Life

This book covers each epoch fully, in a clean, instructive way, taking up puberty, menstruation, marriage, sexual instinct, sterility, pregnancy, confinement, nursing, the menopause.

The Four Epochs of Woman's Life. By ANNA M. GALBRAITH, M. D. With an Introductory Note by JOHN H. MUSSER, M. D., University of Pennsylvania. 12mo of 288 pages. *New (3d) Edition.* March, 1917

Griffith's Care of the Baby

NEW (6th) EDITION

Here is a book that tells in simple, straightforward language exactly how to care for the baby in health and disease; how to keep it well and strong; and should it fall sick, how to carry out the physician's instructions and nurse it back to health again.

Published June, 1915

The Care of the Baby. By J. P. CROZER GRIFFITH, M.D., University of Pennsylvania. 12mo of 458 pages, illustrated. Cloth, $1.50 net

Aikens' Ethics for Nurses

TWO PRINTINGS IN SIX MONTHS

This book emphasizes the importance of ethical training. It is a most excellent text-book, particularly well adapted for classroom work. The illustrations and practical problems used in the book are drawn from life.

Studies in Ethics for Nurses. By CHARLOTTE A. AIKENS, formerly Superintendent of Columbia Hospital, Pittsburg. 12mo of 318 pages. Cloth, $1.75 net. Published April, 1916

Goodnow's History of Nursing

Miss Goodnow's work gives the main facts of nursing history from the beginning to the present time. It is suited for classroom work or postgraduate reading. Sufficient details and personalities have been added to give color and interest, and to present a picture of the times described.

History of Nursing. By MINNIE GOODNOW, R.N., formerly Superintendent of the Women's Hospital, Denver. 12mo of 370 pages, illustrated. Cloth, $2.00 net. Published December, 1916

Berry's Orthopedics for Nurses

The object of Dr. Berry's book is to supply the nurse with a work that discusses clearly and simply the diagnosis, prognosis and treatment of the more common and important orthopedic deformities. Many illustrations are included. The work is very practical.

Orthopedic Surgery for Nurses. By JOHN MCWILLIAMS BERRY, M.D., Clinical Professor of Orthopedics and Rontgenology, Albany Medical College. Cloth, $1.00 net. Published July, 1916

Whiting's Bandaging

This new work takes up each bandage in detail, telling you—and *showing* you by original illustrations—just how each bandage should be applied, each turn made. Dr. Whiting's teaching experience has enabled him to devise means for overcoming common errors in applying bandages.

Bandaging. By A. D. WHITING, M.D., Instructor in Surgery at the University of Pennsylvania. 12mo of 151 pages, with 117 Illustrations. Cloth, $1.25 net. Published November, 1915

Smith's Operating-Room

JUST ISSUED

The object is to show you how to assist the surgeon according to the newest operative technic. You get the result of active experience systematized, and in concise form. You get a thorough digest of every essential; detailed lists of instruments; glossary of medical terms. Every phase of the subject is covered by ample, practical instruction.

The Operating-Room. A Primer for Nurses. By AMY ARMOUR SMITH, R.N., formerly Superintendent of Nurses at the Woman's Hospital of the State of New York. 12mo of 295 pages, illustrated. Cloth, $1.50 net. **Published October, 1916**

Bandler's The Expectant Mother

JUST OUT

This is an anatomy, physiology and hygiene covering those points and functions concerned in child-bearing and designed for the use of the nurse and the mother. Every question of interest to the expectant mother is treated.

The Expectant Mother. By S. WYLLIS BANDLER, M. D., Professor of Diseases of Women, New York Post-Graduate Medical School and Hospital. Cloth, $1.25 net. **Published October, 1916**

Winslow's Prevention of Disease

JUST ISSUED

Here you get a practical guide, giving you briefly the means to avoid the various diseases described. The chapters on diet, exercise, tea, coffee, alcohol, prevention of cancer, etc., are of special interest. There are, besides, chapters on the prevention of malaria, colds, constipation, obesity, nervous disorders and tuberculosis. It is a record of twenty-five years' active practice.

By KENELM WINSLOW, M.D., formerly Assistant Professor of Comperative Therapeutics, Harvard University. 12mo of 348 pages, illustrated. Cloth, $1.75 net. **Published November, 1916**

Brady's Personal Health

JUST OUT

This is different from other health books. It is written by a physician with some fifteen years' experience in writing for the laity. It covers the entire range of health questions—care of mouth and teeth, catching cold, adenoids and tonsils, eye and ear, ventilation, skin, hair and nails, nutrition, nervous ailments, etc.

Personal Health. A Doctor Book for Discriminating People. By WILLIAM BRADY, M.D., Elmira, N.Y. 12mo of 400 pages. Cloth, $1.50 net. **Published September, 1916**

Hoxie & Laptad's Medicine for Nurses

Medicine for Nurses and Housemothers. By GEORGE HOWARD HOXIE, M. D., University of Kansas; and PEARL L. LAPTAD. 12mo of 351 pages, illustrated. Cloth, $1.50 net. *Second Edition—April, 1913*

Böhm & Painter's Massage

Massage. By MAX BOHM, M.D., Berlin, Germany. Edited by CHAS. F. PAINTER, M.D., Tufts College. Octavo of 91 pages, 97 illustrations. Cloth, $1.75 net. *June, 1913*

Boyd's State Registration for Nurses

State Registration for Nurses. By LOUIE CROFT BOYD, R. N., Graduate Colorado Training School for Nurses. Cloth, $1.25 net. *Second Edition—February, 1915*

Morrow's Immediate Care of Injured

Immediate Care of the Injured. By ALBERT S. MORROW, M.D., New York Polyclinic. Octavo of 354 pages, with 242 illustrations. Cloth, $2.50 net.
Second Edition—March, 1912

deNancrede's Anatomy

EIGHTH EDITION

Essentials of Anatomy. By CHARLES B. G. DENANCREDE, M. D., University of Michigan. 12mo of 400 pages, 180 illustrations. Cloth, $1.25 net. *Sept., 1911*

Morris' Materia Medica

SEVENTH EDITION

Essentials of Materia Medica, Therapeutics, and Prescription Writing. By HENRY MORRIS, M. D. Revised by W. A. BASTEDO, M. D., Columbia University, New York. 12mo of 300 pages, illustrated.
Cloth, $1.25 net. *Published March, 1905*

Register's Fever Nursing

A Text-Book on Practical Fever Nursing. By EDWARD C. REGISTER, M.D., North Carolina Medical College. Octavo of 350 pages, illustrated. Cloth, $2.50 net. *June 1907*